

# Five-Year Review Report

Fourth Five-Year Review  
for  
Nyanza Chemical Waste Dump Superfund Site  
Ashland, Massachusetts

May 2009

Prepared by:

The United States Environmental Protection Agency  
Region 1, New England  
Boston, Massachusetts



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USEPA Region I

Date: *May 13, 2009*

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## ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DL	Detection Limit
DNAPL	Dense Non-Aqueous Phase Liquid
EA	Endangerment Assessment
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
ICF	ICF International
MassDEP	Massachusetts Department of Environmental Protection
MBTA	Massachusetts Bay Transportation Authority
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MDPH	Massachusetts Department of Public Health
M&MM	Monitoring and Maintenance Manual
NCP	National Contingency Plan
NOAA	National Ocean and Atmospheric Administration
Nobis	Nobis Engineering, Inc.
NPL	National Priorities List
O&M	Operations and Maintenance
OEME	Office of Environmental Measurement and Evaluation
OSWER	Office of Solid Waste and Emergency Response

## ACRONYMS (cont.)

OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbons
PCB	Polychlorinated Biphenyl
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SBHHRA	Supplemental Baseline Human Health Risk Assessment
Shaw	Shaw Environmental, Inc.
Site	Nyanza Chemical Waste Dump Superfund Site
SVOC	Semi-Volatile Organic Compound
TBC	To be considered
TCE	Trichloroethylene
TSD	Treatment, Storage, and Disposal facility
$\mu\text{g/L}$	micrograms per liter
USACE	United States Army Corps of Engineers
USFWS	United States Fish & Wildlife Service
VOC	volatile organic compound
VMS	Vapor Mitigation System

## EXECUTIVE SUMMARY

This is the fourth Five-Year Review for the Nyanza Chemical Waste Dump Superfund Site (Nyanza or Site) located in Ashland, Massachusetts. The review was conducted in accordance with the United States Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) Guidance No. 9355.7-03B-P. This is a *statutory* Five-Year Review because:

- The March 30, 1993 Record of Decision (ROD) for the Site was signed after SARA became effective on October 17, 1986; and
- As required in the March 30, 1993 ROD, hazardous substances remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The purpose of the Five-Year Review is to evaluate whether response actions and original performance standards remain protective of human health and the environment. Once an initial five-year review is complete, the triggering mechanism for subsequent five-year reviews is the completion date of the immediately preceding five-year review. At Nyanza, five-year reviews have been completed as follows:

- First Five-Year Review Report - November 10, 1993
- Second Five-Year Review Report - August 17, 1999
- Third Five-Year Review Report - April 12, 2004

Consistently, the target completion date for this fourth five-year review is April 12, 2009.

Due to the large and complex nature of the contamination at the Site, EPA divided the cleanup activities into four Operable Units (OUs). OU #1 is the former Nyanza Inc. property and several adjacent upland and wetland areas where soils and sludges were contaminated with heavy metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). OU #2 is comprised of a groundwater plume of organic contamination that extends from the former Nyanza Inc. property in a north/northeasterly direction toward the Sudbury River. OU #3 includes the Eastern Wetland, Trolley Brook, Chemical Brook and Outfall Creek/Lower Raceway. These drainageways are located between the former Nyanza Inc. property and the

Sudbury River. OU #4 includes a 26-mile stretch of the Sudbury River where sediment and fish are contaminated with mercury.

EPA completed OU #1 Remedial Action (RA) activities on September 25, 1992 and OU #3 RA activities on May 30, 2002. RAs at OU #2 and OU #4 have not been completed. RA activities are ongoing for OU #2 and Remedial Investigation/Feasibility Study (RI/FS) activities are ongoing for OU #4. In accordance with Section 104(c)(3)(A) of CERCLA, the Massachusetts Department of Environmental Protection (MassDEP) is responsible for Operation and Maintenance (O&M) activities of all RAs.

Following the completion of the 2004 Five-Year Review, EPA further evaluated concerns of vapor mitigation into homes and businesses located above the contaminated groundwater plume. Additional indoor air assessments were performed, and an inhalation risk assessment was completed in October 2005. The risk assessment concluded that a potentially unacceptable risk from continued long-term inhalation of TCE vapors existed. These results prompted EPA to issue an Explanation of Significant Differences (ESD) for OU #2 in September 2006. The ESD mandated that the RAs for OU #2 be divided into two distinct phases: installation of vapor mitigation systems (VMS) and source extraction of dense non-aqueous phase liquid (DNAPL). The installation of VMS was completed at 41 properties between May and October 2007. The MassDEP has assumed responsibility for the O&M activities associated with the VMS. Activities are on-going during the preparation of this Five-Year Review concerning the installation of a DNAPL extraction system.

The Feasibility Study for OU #4 is currently underway. A Supplemental Baseline Human Health Risk Assessment (SBHHRA) for OU #4 was completed in May 2006. The risk assessment concluded that fish caught and consumed from the Sudbury River poses a health risk to both recreational and subsistence anglers. A Supplemental Baseline Ecological Risk Assessment (SBERA) for OU #4 was completed in December 2008. Overall, the results of this SBERA did not indicate that mercury contamination resulting from Nyanza Site discharges are likely to result in population-level risk to ecological receptors residing in or using the Sudbury River. A Record of Decision (ROD) has not yet been issued for OU #4 and is expected in 2009.

A Site inspection to assess the protectiveness of the remedies (for OU #1 and OU #3) was conducted on February 25, 2009. The Site inspection was conducted by members of EPA,



MassDEP, and Nobis Engineering, Inc. (Nobis). No issues threatening the protectiveness of the remedies were identified during the Site inspection, however smaller issues were identified, and recommendations to correct these are included in this Five-Year Review report. The Site inspection did not include the VMS remedy for OU #2 because MassDEP is actively inspecting all VMS as part of their O&M responsibilities.

Protectiveness statements for OU #1 and OU #3 are included in this Five-Year Review. As of the drafting of this review, MassDEP had completed approximately 31 of the 41 VMS inspections. More information is necessary to evaluate the VMS and DNAPL extraction components of OU #2. A protectiveness statement cannot be made for OU #4 until remedial action objectives are established in a ROD. The next Five-Year Review will be conducted in 2014, and is due five years from the date that this Five-Year Review is approved.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name (from WasteLAN):</b> Nyanza Chemical Waste Dump		
<b>EPA ID (from WasteLAN):</b> MAD990685422		
<b>Region:</b> 1	<b>State:</b> MA	<b>City/County:</b> Ashland/Middlesex County
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status</b> (choose all that apply): <input checked="" type="checkbox"/> Under Construction (OU #2) <input checked="" type="checkbox"/> Operating (OU #1, OU #2, OU #3) <input type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		<b>Construction completion date:</b> NA
<b>Has site been put into reuse?</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
<b>Author name:</b> James DiLorenzo		
<b>Author title:</b> Task Order Project Officer		<b>Author affiliation:</b> U.S. EPA Region I
<b>Review period:**</b> 1/2/2009 to 4/2009		
<b>Date(s) of site inspection:</b> 2/25/2009		
<b>Type of review:</b> <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Post-SARA (1991 ROD)  <input type="checkbox"/> NPL-Removal only  <input type="checkbox"/> Non-NPL Remedial Action Site  <input type="checkbox"/> Regional Discretion           </div> <div> <input checked="" type="checkbox"/> Pre-SARA (1985 ROD)  <input type="checkbox"/> NPL State/Tribe-lead           </div> </div>		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input checked="" type="checkbox"/> Other (specify) <u>fourth</u>		
<b>Triggering action:</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Actual RA Onsite Construction at OU # _____  <input type="checkbox"/> Construction Completion  <input type="checkbox"/> Other (specify)           </div> <div> <input type="checkbox"/> Actual RA Start at OU# _____  <input checked="" type="checkbox"/> Previous Five-Year Review Report           </div> </div>		
<b>Triggering action date (from WasteLAN):</b> April 12, 2004		
<b>Due date (five years after triggering action date):</b> April 12, 2009		

\* "OU" refers to operable unit.

**Issues:**

1. Two rusted and bulged drums were observed beside the storage shed.
2. Minor damage to the perimeter fence was noted near the South Gate.
3. A groundwater monitoring program for OU #2 as mandated by the Explanation of Significant Differences has not yet been implemented.
4. Eight of the vapor mitigation systems installed as part of OU #2 failed performance testing in winter 2008/2009.
5. The DNAPL extraction portion of the remedy has yet to be implemented.
6. The institutional controls for OU #2 mandated by the Explanation of Significant Differences have not yet been implemented.

**Recommendations and Follow-up Actions:**

1. Remove and properly dispose of the drums being stored near the storage shed.
2. Repair the damaged fence near the South Gate.
3. Implement a groundwater monitoring program for OU #2.
4. Investigate the cause(s) of reduced negative pressure readings in several systems and make repairs as needed.
5. Implement the DNAPL remedy.
6. Put institutional controls (i.e. zoning ordinance) in place to reduce the potential for exposure to contaminated groundwater and vapors.

**Protectiveness Statement(s):****Protectiveness of Source Control and Soil (OU #1)**

The remedy for OU #1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

**Protectiveness of Off-Site Groundwater (OU #2)**

A protectiveness statement of the remedy at OU #2 cannot be made at this time until further information is obtained. Further information will be obtained by:

- Completing inspections of the 41 VMS units, and
- Implementing modifications and repairs as required to achieve the minimum pressure based performance standard at all monitoring locations.

MassDEP is actively inspecting the VMS units and implementing repairs where necessary. It is expected that these actions will take approximately 90 days to complete, at which time a protectiveness determination will be made.

**Protectiveness of Wetlands and Drainageways (OU #3)**

The remedy for OU #3 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

## 1.0 INTRODUCTION

The purpose of this Five-Year Review is to determine if the remedy selected for the Nyanza Chemical Waste Dump Superfund Site in Ashland, Massachusetts continues to be protective of human health and the environment. This report summarizes the Five-Year Review processes, investigations, and remedial actions undertaken at the Site; evaluates the monitoring data collected; reviews, as appropriate, the Applicable or Relevant and Appropriate Requirements (ARARs) specified in the Record of Decision (ROD) for changes; discusses any issues identified during the review; and presents recommendations to address those issues.

The United States Environmental Protection Agency, Region 1 (EPA) prepared this *statutory* Five-Year Review consistent with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan. CERCLA §121 states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such Site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

The EPA interpreted this requirement further in the National Contingency Plan; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

EPA conducted this Five-Year Review of the remedial actions implemented at the Site. Nobis Engineering, Inc. (Nobis) supported EPA in completion of the review under EPA Contract No. EP-S1-06-03. Work on this review was undertaken between January and April 2009.

This is the fourth Five-Year Review for the Site. Once an initial five-year review is complete, the triggering mechanism for subsequent five-year reviews is the completion date of the immediately preceding five-year review. At Nyanza, five-year reviews have been completed as follows:

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EPA completed OU #1 Remedial Action (RA) activities on September 25, 1992 and OU #3 RA activities on May 30, 2002. RAs at OU #2 and OU #4 have not been completed. RA activities are ongoing for OU #2 and Remedial Investigation/Feasibility Study (RI/FS) activities are ongoing for OU #4. In accordance with Section 104(c)(3)(A) of CERCLA, the Massachusetts Department of Environmental Protection (MassDEP) is responsible for Operation and Maintenance (O&M) activities of all RAs.

## 2.0 SITE CHRONOLOGY

**Table 2-1  
Chronology of Site Events  
Nyanza Chemical Waste Dump Superfund Site  
Ashland, Massachusetts**

Event	Date
Initial discovery of contamination in the Sudbury River.	01/01/80
Site listed on the National Priorities List (NPL)	09/08/83
OU #1 Record of Decision (ROD) signed	09/04/85
OU #1 Remedial Investigation/Feasibility Study (RI/FS) completed	09/04/85
Removal Action completed	4/30/87
OU #1 MassDEP Operation and Maintenance (O&M) Plan finalized	11/87
OU #1 Remedial Design (RD) completed	12/11/87
Removal Action completed	06/10/88
Removal Action completed	02/10/89
Removal Action completed	04/21/89
OU #1 Remedial Action (RA) construction commenced	01/01/89
Removal Action completed	05/07/90
OU #2 Interim ROD signed	09/23/91
OU #2 RI/FS completed	09/23/91
Removal Action completed	06/18/92
OU #1 Explanation of Significant Differences (ESD) issued	09/21/92
OU #1 RA report completed	09/25/92
OU #3 ROD signed	03/30/93
OU #3 RI/FS completed	03/30/93
First Five-Year Review completed	11/10/93
OU #2 Treatability Study completed	10/31/96
OU #3 RD completed	09/28/98
OU #3 RA construction commenced	03/18/99
Second Five-Year Review completed	08/17/99
OU #3 RA construction completed	08/01
OU #3 RA report completed	05/30/02
OU #1 and OU #3 O&M Plan finalized	04/03
Third Five-Year Review completed	04/12/04
Ashland Nyanza Health Study – Final Report - MDPH	04/06
OU #4 Final Human Health Risk Assessment issued	05/06
OU #2 Explanation of Significant Differences issued	09/28/06

Event	Date
Addendum to Third Five-Year Review issued	11/01/06
OU #2 Final Report, Residential Indoor Air Study, November 2006 issues	03/12/07
OU #4 Draft Supplemental Baseline Ecological Risk Assessment issued	04/07
OU #2 Commencement of construction of Vapor Mitigation Systems (VMS)	05/21/07
OU #2 Final VMS installed	09/28/07
OU #2 RA Report for VMS completed	06/30/08
OU #2 Monitoring and Maintenance Manual Package for VMS issued	08/08
MassDEP begins O&M of the VMS	12/08
OU #4 Final Supplemental Baseline Ecological Risk Assessment issued	12/19/08
Fourth Five-Year Review completed	05/09

### 3.0 BACKGROUND

This section contains information pertaining to the Site's physical characteristics, current and prior land use at the property, as well as waste identification and characterization information. This information has been obtained through a review of historical information, previous investigations, zoning and flood maps, and a Site visit.

#### 3.1 Physical Characteristics

The Site is located in the Town of Ashland, Middlesex County, Massachusetts. Ashland is located 25 miles west-southwest of Boston, and 20 miles east-southeast of Worcester. Refer to Figure 1 for a Site Locus Plan. The Site is comprised of three distinct areas: the 35-acre former Nyanza, Inc. property which currently consists of wetlands, the Megunko Hill area, and an industrial park along Megunko Road; drainageways between the former Nyanza Inc. property and the Sudbury River, consisting of the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway; and a 26-mile stretch of the Sudbury River down to its confluence with the Assabet River in Concord, Massachusetts.

EPA divided the cleanup activities at the Site into four OUs. OU #1 includes the former Nyanza, Inc. property and several adjacent upland and wetland areas where soils and sludges were contaminated with heavy metals, VOCs, and SVOCs. OU #2 includes a groundwater plume of organic contamination that extends from the former Nyanza, Inc. property in a north-northeasterly direction toward the Sudbury River. OU #3 includes the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway. These drainageways are located between the former



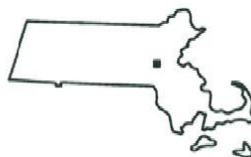


USGS TOPOGRAPHIC MAP  
FRAMINGHAM, MASSACHUSETTS  
1987

APPROXIMATE SCALE  
1 INCH = 2,000 FEET



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QUADRANGLE LOCATION

## FIGURE 1

LOCUS PLAN  
NYANZA CHEMICAL WASTE DUMP  
SUPERFUND SITE  
ASHLAND, MASSACHUSETTS

PROJECT: 80039.06

MARCH 2009



Nyanza, Inc. property and the Sudbury River and are referred to as the Continuing Source Areas because they previously acted as continuing sources of mercury contamination to the Sudbury River. OU #4 includes a 26-mile stretch of the Sudbury River where sediment and fish are contaminated with mercury.

The primary Site owner currently leases the old plant grounds to various businesses. Approximately 10,000 people live within 3 miles of the Site.

### **3.2 Land and Resource Use**

From 1917 to 1978, several companies involved in the manufacturing of textile dyes and dye intermediates, inorganic colloidal solids, and acrylic polymers occupied the Site. Nyanza, Inc. was the most recent dye manufacturing company to occupy the Site. They operated at the Site from 1965 until 1978. The former plant grounds are currently occupied by several industrial businesses, the largest of which is Nyacol Products, Inc.

Starting in 1917, several types of chemical wastes were disposed of in various locations on the Site property with a majority of these wastes deposited on Megunko Hill, which was used as an unsecured landfill. Wastes included partially treated process wastewater, chemical sludge from the wastewater treatment process, solid process wastes (e.g. chemical precipitate and filter cakes) in drums, solvent recovery distillation residues in drums, and off-specification products. Process chemicals that could not be recycled or reused (including phenol, nitrobenzene, and mercuric sulfate) were also disposed of on the Site property. Over 45,000 tons of chemical sludges generated by wastewater treatment processes, along with spent solvents and other chemical wastes, were buried on the property. The area that contained the largest amount of buried waste and exposed sludge was referred to as the Hill section.

Chemical wastes were also disposed of in the wetland areas. The Area G Wetland and Eastern Wetland received waste effluent discharge from various manufacturing operations. The portion of the Area C Wetland at the headwaters of Chemical Brook contained wastewater treatment sludge and possibly received overflow from an underground concrete wastewater vault that discharged into Chemical Brook.

### **3.3 History of Contamination**

Nyanza, Inc. and its predecessors originally discharged the dye waste stream to a concrete vault (or settling pond) adjacent to the main process building. The vault was used as a central sump for the collection of wastewater from the entire Nyanza, Inc. operation, as well as from other generating tenants housed in the immediate vicinity. This vault was approximately 40 x 80 feet and approximately 10 feet deep. The liquid occasionally overflowed via a pipe into Chemical Brook, which flowed into Trolley Brook and underground through Chemical Brook Culvert into Outfall Creek, and then into the Raceway that entered the wetlands along the Sudbury River. The vault was taken out of service in the 1960s or 1970s, but continued to be a source of groundwater contamination at the Site until its removal in 1988. Nyanza, Inc. connected to the Metropolitan District Commission sewer collection system in March 1970.

### **3.4 Initial Response**

The following is a summary of the Pre-ROD Removal Actions performed at the Site:

- Removal Action completed on April 30, 1987 by a potentially responsible party (PRP) – one jar (approximately one gallon) of sodium picrate removed by Nyacol Products, Inc.;
- Removal Action completed on June 10, 1988 by EPA – approximately 12,025 tons of sludge were removed from an underground vault and placed into the landfill cell. The contaminants present included, but were not limited to, trichloroethylene, chlorobenzene, and nitrobenzene. Inorganic contaminants found in the sludge included heavy metals such as arsenic, cadmium, chromium, mercury, and lead. From October to December 1987, 665 tons of soil adjacent to the vault were removed (309 tons were incinerated and 356 tons were shipped off-site to an approved landfill). In 1988, 2,512 tons of sludge from the vault were solidified on-site and disposed of at an off-site Resource Conservation and Recovery Act (RCRA) landfill facility;
- A Removal Action was completed on February 10, 1989 by a PRP – one 10,000 gallon tank containing sulfuric acid sludge was removed by Edward Camille;
- A Removal Action under the name "Megunco Road" was completed on April 21, 1989 by EPA;

- A Removal Action referred to as Ashland Drum Removal was completed on May 07, 1990 by EPA; and
- A Removal Action was completed on June 18, 1992 by EPA – signs were posted along Sudbury River warning not to eat the fish. Signs were re-posted in 1998 and 2008.

### **3.5 Basis for Taking Action**

The first type of contamination linked to the Site was mercury, first discovered in the Sudbury River in 1970, as part of an overall investigation of mercury problems in Massachusetts. Samples of fish from the river contained levels of methylmercury exceeding US Food and Drug Administration's safe consumption standard of 1 milligram per kilogram (mg/kg). A follow-up study in 1972, focusing on Nyanza, Inc., revealed mercury contamination in the Sudbury River was caused by uncontrolled sludge and wastewater disposal at the property. The Site was included on the original National Priorities List (NPL) of Superfund Sites in 1981 and was finalized on the NPL in 1983.

The groundwater, soil, sediments, and surface water on and adjacent to the Site were contaminated with heavy metals and chlorinated organics. The groundwater and soil were also contaminated with spent solvents and chemical wastes. Health threats included direct contact with or accidental ingestion of contaminated groundwater or soil. Nearby wetlands and fish in the Sudbury River were contaminated with mercury. In addition, sediments in the Sudbury River also have elevated mercury levels.

## **4.0 REMEDIAL ACTION**

This section describes the Remedial Actions (RA) selected for and implemented at the Site.

### **4.1 Remedy Selection**

The RA objectives for three OUs, as described in their respective RODs, are described in the following sections. A remedy has not yet been selected for OU #4, and therefore RA objectives have not been established and OU#4 is not discussed in this section.

#### **4.1.1 Remedial Action Objectives: Source Control and Soil (OU #1)**

The RA objectives selected in the 1985 OU #1 ROD to address contaminated soils and sediments at the Site are as follows:

- Reduce generation of contaminated leachate and thereby mitigate future groundwater contamination;
- Minimize off-site contaminant migration via surface runoff and air transport; and
- Minimize direct human and environmental exposure to contaminated sediments.

To meet these objectives, the OU #1 ROD specified that the wastes be isolated to minimize contact with groundwater, surface water, and air and to prevent human and animal exposure. Contaminants of concern for the various media were not identified in the ROD.

On September 21, 1992, an ESD was issued for OU #1. The modifications to the actual constructed remedy were documented in the OU #1 RA report and the ESD. The most significant modification to the OU #1 ROD was to postpone the restoration of the Area G wetland until OU #3.

#### **4.1.2 Remedial Action Objectives: Off-Site Groundwater (OU #2)**

A 1991 OU #2 ROD was written as an Interim Remedy, with the intent to further evaluate the effectiveness of groundwater extraction and treatment in meeting drinking water standards after an initial 5-year operational period. The RA objectives selected in the 1991 interim ROD to address groundwater contamination at the Site are as follows:

- Reduce migration of contaminants in groundwater;
- Reduce risks to human health associated with potential future consumption and direct contact with groundwater;
- Reduce risks from present and potential future inhalation of evaporated groundwater contaminants;
- Limit degradation of the Sudbury River and wetlands due to the natural discharge of contaminated groundwater; and
- Comply with Federal and State ARARs, including drinking water standards.

The five-year interim pump and treat remedy was not implemented due to the discovery of pockets of highly concentrated liquid contamination, or DNAPL, during early treatability studies.

In September 2006, an ESD was issued for OU #2. The ESD does not modify the general goals for groundwater remediation established in the 1991 interim ROD, but rather furthers these goals by creating two distinct remedial phases: 1) installation of VMS in buildings located over the most contaminated portions of the groundwater plume, and 2) installation of a DNAPL extraction system. The ESD included the following activities:

- Extraction of DNAPL with off-site treatment and/or disposal;
- Performance of routine groundwater monitoring to assess any changes in plume concentrations and migration;
- The installation, on a voluntary basis, of VMS in approximately 40 to 50 structures (mostly homes) located in the northeast portion of the plume, in an area generally bracketed by Tilton Avenue and Water Street to the west, the Sudbury River to the north and to the east, and the railroad tracks to the south;
- Performance of additional air testing, on a voluntary basis, at approximately 10 to 15 additional homes and businesses located above remaining areas of the plume, generally described as areas immediately west of Forest Street and southeast of the Town Hall along Main Street, as well as the commercial complex to the northeast of the Town Hall along Main Street; and
- Installation of small diameter monitoring wells or piezometers in the areas generally described above to more accurately determine the extent of the shallow groundwater plume.

In addition, the ESD provided clarification on the use of institutional controls to prevent exposure to contaminated groundwater.

#### **4.1.3 Remedial Action Objectives: Wetlands and Drainageways (OU#3)**

The RA objectives selected in the 1993 OU #3 ROD to address mercury-contaminated sediments at the Site are as follows:

## Human Health Objectives

- Mitigate mercury contamination in sediment in areas where accidental ingestion and dermal contact with contaminated sediments may result in unacceptable human health risks;
- Mitigate mercury contamination in sediment in order to reduce mercury levels in fish, which may be consumed by fisherman; and
- Mitigate mercury contamination in sediment in the Continuing Source Areas in order to prevent continued migration of contamination to the Sudbury River.

## Ecological Objectives

- Mitigate mercury contamination in sediment to achieve an increased level of protection to environmental receptors, approximately equal to that found in background areas, in the Continuing Source Areas;
- Mitigate mercury contamination in sediment in the Continuing Source Areas in order to prevent continued migration of contamination to the Sudbury River; and
- Restore any wetland habitat disturbed during remediation.

### **4.2                   Remedy Implementation**

This section describes the completion of the tasks for each OU as required by the ROD.

#### **4.2.1                   Operable Unit #1**

On September 4, 1985, EPA issued the OU #1 ROD. The OU #1 ROD called for consolidating sediments and waste from satellite areas onsite in a landfill cell on Megunko Hill, followed by capping the waste under an impermeable cap, and constructing an upgradient interceptor trench to collect and divert groundwater and surface water flows away from the landfill. Specifically, the remedy included excavating all outlying sludge deposits and contaminated soils and sediments associated with these deposits, consolidating this material with the Megunko Hill sediments and waste deposits, capping the Megunko Hill section to prevent water from entering it and spreading contaminants, constructing a groundwater and surface water diversion system on the upgradient side of the Megunko Hill area, backfilling the excavated areas to original grade, establishing a vegetative cover in the wetland areas, and constructing a more extensive groundwater monitoring system to allow for future evaluation of the cap. Approximately 60

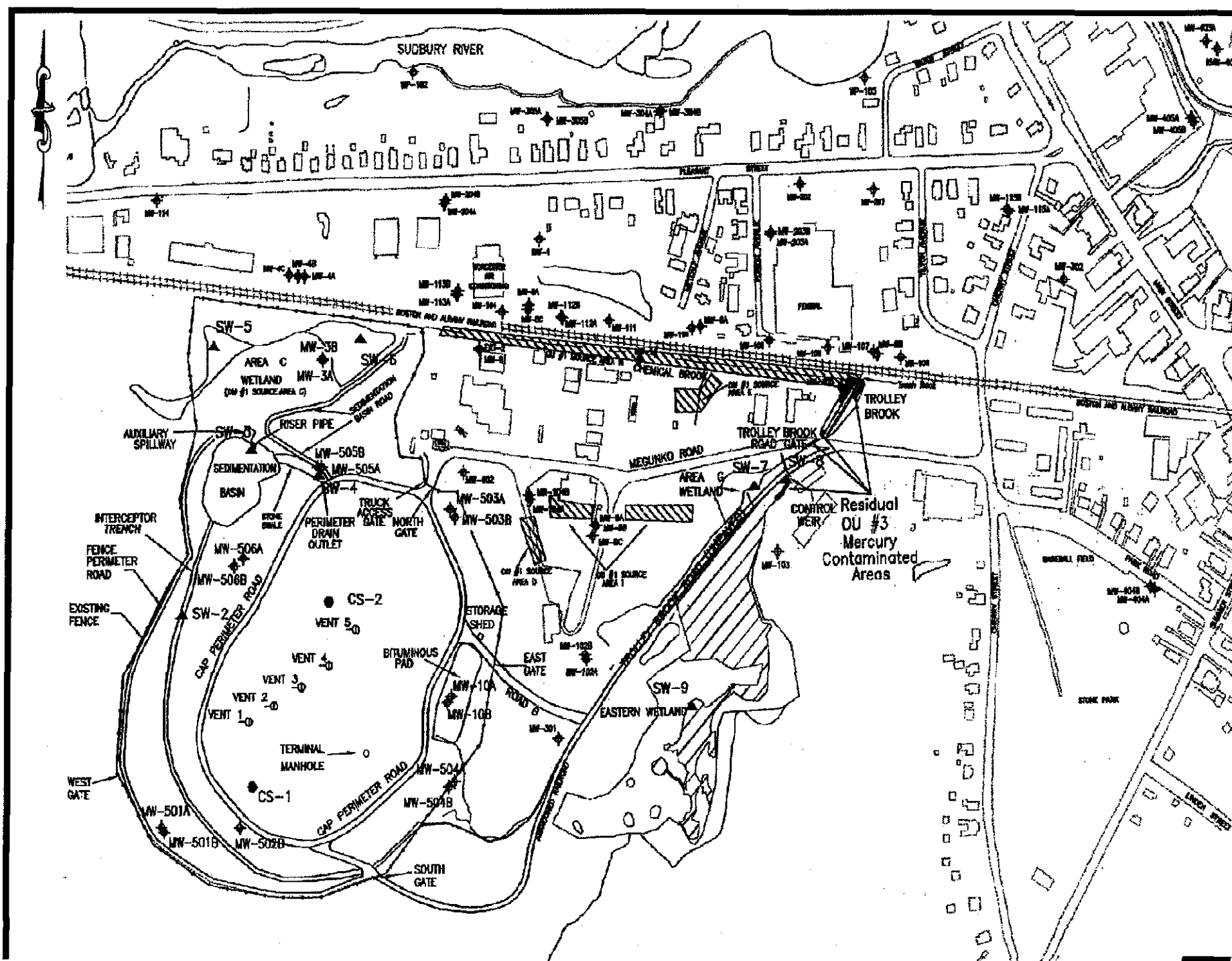
percent of the capped Megunko Hill area originally contained surficial contamination, which was not excavated however was a component of the capped landfill cell. The remaining portion of the area to be capped was excavated to bedrock to create a landfill cell for the disposal of contaminated soils and solidified sludges from the on- and off-site cleanup areas. More than 65,000 cubic yards of contaminated soil were excavated and placed in the landfill cell in 1990. Final construction of the cap was completed in 1991. All OU #1 cleanup actions were completed in late 1992. Modifications to the actual constructed remedy were documented in the OU #1 RA report and ESD. In particular, the most pertinent modification to the OU #1 ROD was to postpone the restoration of the Area G Wetland until OU #3. To maintain the effectiveness of the OU #1 remedy, the MassDEP assumed Operation and Maintenance (O&M) responsibilities and conducts routine inspections and makes any necessary repairs. O&M was temporarily suspended to allow OU #3 RA construction activities to be completed. O&M activities resumed in 2003 after the OU #3 RA were completed and the O&M Plan was updated. Refer to Figure 2 for a depiction of the remedies for OU #1 and OU #3.

#### **4.2.2 Operable Unit #2**

Operable Unit #2 was originally established to address groundwater contamination. Through the completion of various studies and additional monitoring, the scope of OU#2 has expanded to address DNAPL recovery and vapor mitigation.

##### **1991 Interim ROD**

In June 1987, EPA authorized the initiation of investigative activities for OU #2 to address contaminated groundwater migrating from the Site. An interim ROD was signed on September 23, 1991. The selected remedy included extraction and treatment of groundwater for a minimum of five years and conducting additional studies before adoption of a final remedy. Technical design studies for the selected remedy began in early 1992. A pilot groundwater extraction and treatment system was constructed. DNAPL was discovered during installation of two of the three extraction wells. Pump tests were performed to first try to evacuate the DNAPL. Extremely slow recovery rates were observed. The full-scale pump test then proceeded with capture of groundwater mixed with DNAPL. It was quickly learned that the DNAPL emulsion proved hostile to the pump seals and the pumps ceased to function. In 1994, the pilot was discontinued, and groundwater extraction and treatment remedy was postponed indefinitely. The Interim ROD also required institutional controls in the form of well permit restrictions to prevent the installation of new wells within the plume area. Although a process of formal well





permit restrictions has not been established, EPA has established an informal process of communication with the Ashland Board of Health to ensure that property owners are aware of the plume. There are no known production wells located within the plume and the Town of Ashland does not use groundwater from the contaminated plume for their drinking water supply. Refer to Figure 3 for a depiction of the groundwater plume.

Groundwater monitoring was initiated in 1998 on a semi-annual basis until 2004. The results of initial data indicated that the contaminated shallow groundwater plume extends under numerous homes, businesses and municipal buildings, which prompted EPA to undertake an indoor air sampling program. Indoor air samples were collected from nine residences, the Town Hall, and the police department in late 1998 to determine if contaminants in the groundwater were volatilizing and migrating into homes and businesses at levels that might affect public health. Results of the sampling indicated that none of the five targeted compounds exceeded levels deemed safe by EPA and MassDEP.

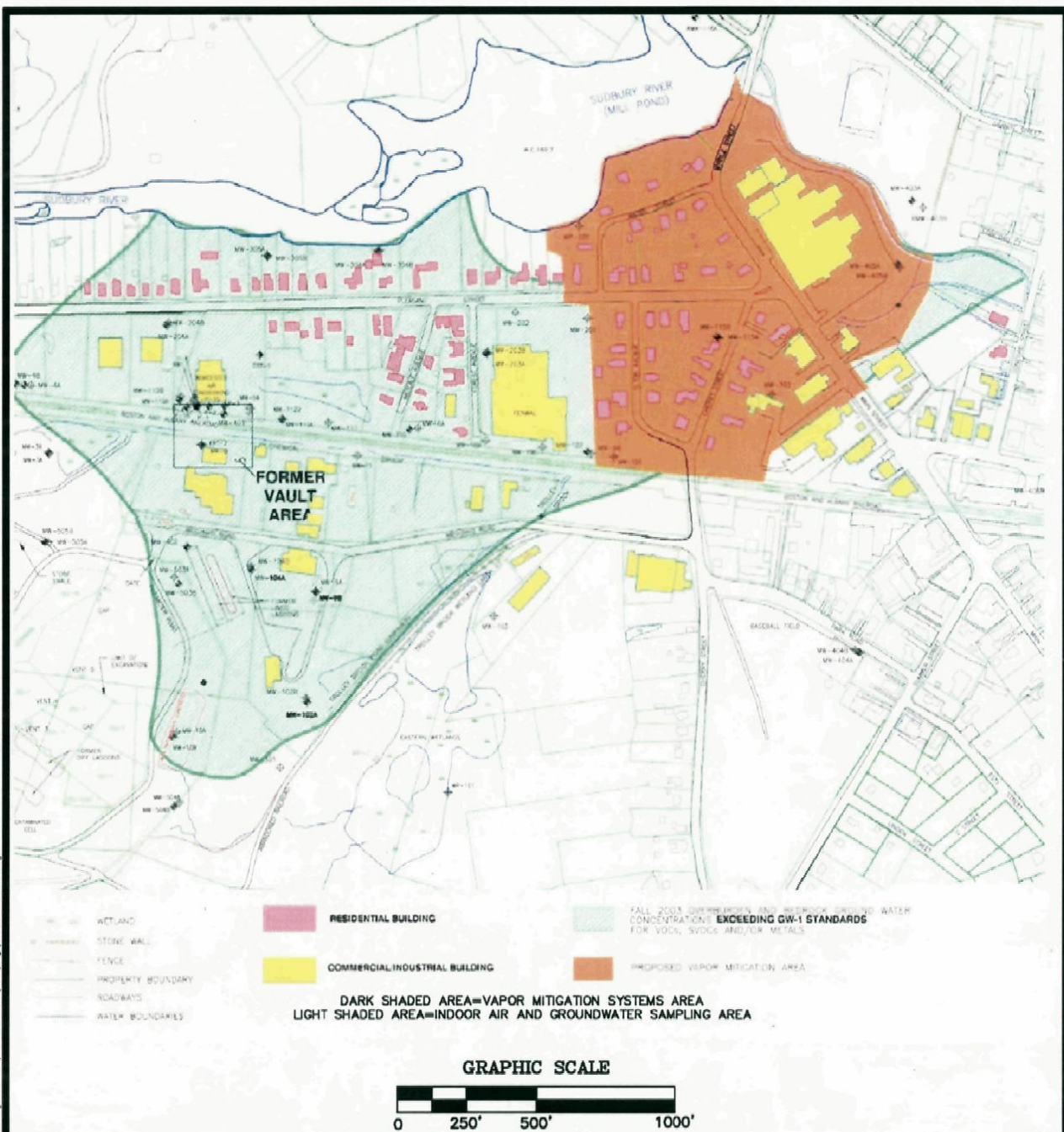
Between 1999 and 2003, several studies were conducted to evaluate potential ecological risks posed by the groundwater plume discharging into the Sudbury River. Results indicated that aquatic life was impacted in one of three areas studied, but that the impact could not definitively be tied to the groundwater plume or other existing natural habitat conditions such as storm water runoff, low dissolved oxygen levels, stagnant water, or high amounts of detritus (leaf litter). Additional monitoring was recommended because this impacted area is directly upstream of the Lower Raceway, where mercury-contaminated sediments were excavated during OU #3.

A final ROD for OU#2 will be completed based on additional studies and pending the effectiveness of DNAPL recovery efforts to be performed under the ESD described below.

### **2006 ESD**

A second indoor air monitoring program was conducted in 2004. The volatile organic compound trichloroethene (TCE) and four other contaminants (vinyl chloride, chlorobenzene, benzene, and 1,4-dichlorobenzene) were detected in five of the seven homes sampled. No sampling was conducted at the Town Hall or the police station. TCE was detected in indoor air at concentrations ranging from 1.3 to 2.9  $\mu\text{g}/\text{m}^3$ , which were all below the existing screening level of 134  $\mu\text{g}/\text{m}^3$ . However, the screening level of 134  $\mu\text{g}/\text{m}^3$  was based on EPA's withdrawn 1987 toxicity value for a target

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Nobis Engineering, Inc.  
Tel (603) 224-4182  
Fax (603) 224-2507  
www.nobisengineering.com

FIGURE 3

PORTION OF PROPERTIES WITH  
VAPOR MITIGATION SYSTEMS  
NYANZA CHEMICAL WASTE DUMP  
SUPERFUND SITE  
ASHLAND MASSACHUSETTS

DRAWN BY: ML  
PROJECT: 80039.06

APPROVED BY: JM  
MARCH 2009

cancer risk level of  $1 \times 10^{-04}$ . In 2001, EPA proposed a range of new toxicity values regarding the risk from TCE. As a result, the screening level of  $134 \mu\text{g}/\text{m}^3$  was recalculated to a proposed screening range of 2 to  $43 \mu\text{g}/\text{m}^3$  for a target cancer risk level of  $1 \times 10^{-04}$ . Concentrations of TCE in three of the homes exceeded the lower end of the proposed screening range. Exceedance of the new screening level range prompted EPA to perform a risk assessment on all the available air data (i.e., 1998 and 2004 air data) to determine if there were potentially unacceptable inhalation risks. The risk assessment concluded that comparison of the proposed TCE toxicity standard to the TCE vapor results indicated there was a potentially unacceptable risk from continued long-term inhalation of TCE vapors in seven of the fourteen homes sampled, and in the Town Hall. Based on the results of the risk assessment, EPA signed an ESD for OU #2 on September 29, 2006. Refer to Section 4.1.2 for a description of the activities mandated by the ESD.

Inspections of each proposed vapor mitigation property were performed by the United States Army Corp of Engineers (USACE) from October 3 to 28, 2006. Based on the requirements of the ESD and the property inspections, a conceptual design was released by USACE on December 22, 2006. The finalized work plan was issued by USACE on February 12, 2007. The work plan contained a layout for each specific system.

The ESD required that certain pre-construction activities be performed to more accurately delineate the vapor mitigation area. In November 2006, the EPA New England, Office of Environmental Measurement and Evaluation (OEME) performed an indoor air and soil gas sampling study. The goal of the air study was to determine and verify the areal extent where a public health threat existed due to VOCs from contaminated groundwater migrating into buildings and impacting indoor air quality. This goal was accomplished by sampling at properties within or on the edge of the designated GW-1 area for VOCs. The GW-1 area was defined as the area where overburden and bedrock groundwater concentrations exceed the MassDEP GW-1 standards for VOCs. The target VOCs designated for this sampling event were: vinyl chloride, benzene, chlorobenzene, 1,4-dichlorobenzene, and TCE.

During the week of November 13, 2006, an indoor air study was completed at eleven properties and six one-inch diameter groundwater monitoring wells were installed along the previously defined edges of the groundwater plume. The wells were screened at the water table and subsequently sampled for VOCs in December 2006, along with some nearby existing monitoring

wells. Air and groundwater sampling data resulted in the addition of two residential properties to the list of properties where VMS would be offered. The final number of properties to be offered systems was 41.

Site mobilization began on May 21, 2007, and actual construction of the VMS began on May 24, 2007. A total of 43 systems were installed in 41 properties. Refer to Figure 3 for the locations of the properties where VMS were installed.

However, at the forty-second property, the property owner refused access for the purpose of installing a system, or collecting indoor air and soil gas data. This property houses two apartments. Both tenants were informed of the owner's refusal to install a VMS. A notice was provided to the local Board of Health to ensure that any future tenants are made aware of the possible vapor intrusion concern. EPA determined that deed restrictions are not appropriate for this property since no actual data exists to confirm that an inhalation health risk exists.

A Remedial Action Report for the Vapor Mitigation Phase of OU #2 was issued on June 30, 2008. The report documented the activities summarized above, as well as a summary of the project costs. To maintain the effectiveness of the OU #2 remedy, the MassDEP assumed O&M responsibilities and conducts routine inspections and makes any necessary repairs.

Regarding DNAPL extraction and off-site treatment and disposal, a work plan was approved by EPA on May 7, 2008. The Site-specific Quality Assurance Project Plan (QAPP) was approved by EPA in September 2008. Pre-investigation activities occurred in the Fall of 2008. It is anticipated that monitoring well installations, and sampling of groundwater and DNAPL will occur in 2009. Refer to Section 5.2.2 for a description of the activities performed in fall 2008 as part of the DNAPL remedy.

#### **4.2.3 Operable Unit #3**

OU #3 addressed wetlands and drainageways between the former Nyanza Inc. property and the Sudbury River that acted as continuing sources of mercury contamination to the Sudbury River. The Continuing Source Areas included the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway. The remedy provided for:

- Excavation of sediment with mercury levels above 1 mg/kg from the Continuing Source Areas (this cleanup level is protective of aquatic organisms as well as human health under all exposures scenarios).
- Dewatering of the contaminated sediment.
- Disposal of dewatered sediment under a portion of the cap constructed under OU #1.
- Reconstruction of the area of the cap removed during disposal.
- Treatment of water from the dewatering operation with discharge to an on-site surface water body.
- Restoration of impacted wetland areas.
- Institutional controls to limit exposure to contaminants in the Sudbury River.
- Planning and implementation of public awareness activities to increase public knowledge about contamination remaining in the Sudbury River sediments and fish.
- Performing certain pre-design studies to aid in the design of the selected remedy.
- Creation of OU #4 to conduct additional investigation of the Sudbury River.

The design of the remedy was completed in 1998. Cleanup activities commenced in March 1999 and were completed in August 2001.

#### **4.3 Operations and Maintenance**

In accordance with Section 104(c)(3)(A) of CERCLA, MassDEP is responsible for all O&M activities for the 30-year expected life of these remedies. Because OU #1 RA activities were completed on November 7, 1991, MassDEP is responsible for OU #1 O&M activities through November 6, 2021. Because OU #3 activities were completed on November 7, 2001, MassDEP is responsible for OU #3 O&M activities through November 6, 2031. Because OU #2 activities for VMS were completed on September 28, 2007, MassDEP is responsible for OU #2 VMS-related O&M activities through September 2037.

MassDEP OU #1 O&M activities began in 1991. OU #1 O&M activities were temporarily suspended between 1999 and 2002 to allow OU #3 RA construction activities to be completed. OU #3 RA was completed in November 2001. OU #1 and OU #3 O&M activities resumed in 2003 and the O&M Plan was updated.

The O&M Plan provides guidance regarding O&M activities necessary to ensure the OU #1 and OU #3 remedies remain protective of human health and the environment. The activities required by the revised O&M Plan are as follows:

Quarterly inspections and maintenance of the Site;

- Quarterly air screening of 5 cap vents, 15 monitoring wells and the terminal manhole to monitor air quality and emissions;
- Quarterly groundwater level measurements of 15 monitoring wells and the terminal manhole to monitor the efficiency and effectiveness of the Groundwater Interceptor Trench and underdrain system, and determine seasonal changes in groundwater elevations;
- Semi-annual groundwater sampling of 15 monitoring wells and the terminal manhole to monitoring the groundwater quality in order to detect significant changes in water quality;
- Annual surface water sampling at nine locations;
- Soil testing of cap soils every three years or as needed; and
- Air, sediment, and leachate sampling, as needed.

These activities are performed through a combination of quarterly Site inspections, maintenance activities, and monitoring requirements. The implementation of the OU #1 and OU #3 remedies resulted in the construction of various components, which are therefore subject to O&M activities. These components are covered specifically in the 2003 O&M Plan.

Both the remedies for OU #1 and OU #3 involved excavating contaminated sediment in wetland areas and extensive wetland restoration activities were performed. Upon the completion of OU #3 restoration activities in 2001, USACE conducted long-term wetlands monitoring activities for three years (January 2001 through December 2003). MassDEP is responsible for conducting long-term wetland monitoring activities through 2009. After the 2009 efforts, MassDEP will prepare a report documenting whether there exists a need for continued monitoring and maintenance at the restored wetland areas.

For OU #2, a Monitoring and Maintenance Manual (M&MM) for the VMS was issued for the Site in August 2008. The EPA and MassDEP do not have any regulatory requirements which dictate

how to maintain a vapor mitigation system; however the M&MM outlined the following schedule for monitoring and maintenance of the vapor mitigation systems:

- Initial inspection of all 43 sub-slab depressurization systems during the winter 2008/2009. Inspection will include visual check of all external and interior system components and monitoring of all pressure points to ensure and adequate pressure field;
- Between 2010 and 2015, seven systems will be inspected each year. The specific properties will be determined by the MassDEP;
- A system survey will be conducted every year for each system not inspected, to determine if the fan is running (except Property B, check manometer only). The system survey will be performed by listening and touching the fan casing to determine if it is operating; and
- Complete inspection and monitoring will be conducted during all maintenance calls (unless it is a follow up and a full inspection was recently conducted).

The following documentation forms were included with the M&MM: inspection checklist, property maintenance record, resident contact record, resident notification of visit, and system survey report. Records will be updated and maintained by the inspector and the MassDEP.

In December 2008, MassDEP began O&M of the 43 VMS installed as part of the OU #2 remedy. A performance standard was established based on MassDEP guidance. The performance standard is based on the principal of attaining a minimal negative pressure at each property to ensure adequate capture of the vapors, and was established at 0.004 inches of water column (1 Pascal). To date, eight of the 31 VMS inspected do not appear to achieve the minimum negative pressure at one of more permanent monitoring locations. Monitoring equipment available for the inspections differs from monitoring equipment used at the time of the installations. This may explain the consistently lower pressure readings currently being observed. Regardless, these systems are functioning and continue to achieve measurable vacuum at the manometer. Corrective measures include physical repair to any visible cracks in the basement slab or walls, enlargement of the VMS suction pit, replacement of the VMS fan

with a larger motor, or any combination of these actions as is necessary to achieve the established performance-based pressure. These inspections are ongoing.

The Five-Year Review Site Inspection was conducted on February 25, 2009. Refer to Section 6.0 of this report for a summary of the Five-Year Review Site Inspection.

## **5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW**

The third Five-Year Review was completed on April 12, 2004. An Addendum to the third Five-Year Review was issued on November 1, 2006. The protectiveness statements from the third Five-Year Review, and the addendum, were as follows:

- **Protectiveness of Source Control and Soil (OU #1)**

The remedy for OU #1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

- **Protectiveness of Off-Site Groundwater (OU #2)**

The remedy at OU #2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled to the extent practicable.

- **Protectiveness of Wetlands and Drainageways (OU #3)**

The remedy for OU #3 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

## **5.1 Status of Recommendations from Previous Five Year Review**

In the previous Five-Year Review, a list of recommended actions for continued O&M of the remedies and associated features was developed. These issues are presented in Table 5-1. Table 5-1 also includes a description of what actions were taken to resolve the issues noted in the previous Five-Year Review.



**Table 5-1**  
**Status of Recommendations from Previous Five-Year Review**  
**Nyanza Chemical Waste Dump Superfund Site**  
**Ashland, Massachusetts**

Issues from Previous Review	Action Taken and Outcome
Institute procedures to ensure gates are locked at all appropriate times to prevent unauthorized access.	During the fall of 2004 new locks (all keyed the same) were installed at the site. During the Site inspection in February 2009, all of the gates were locked and in good condition.
Replace damaged or missing signs along the perimeter fence.	New signs were hung approximately every 20 feet along the perimeter fence during the fall of 2004. Signs appeared to be in good condition during the February 2009 Site inspection.
Remove overgrown vegetation from and re-grade all roadways as necessary.	These activities were performed in Fall 2004 and Winter 2005. Vegetation was cut back and well maintained and roads were in good condition during the February 2009 Site inspection.
Removal all vegetation from landfill side slopes.	Herbicide is applied to vegetation growth as necessary. No overgrown vegetation was observed on slopes during the February 2009 Site inspection.
Prohibit driving on landfill side slopes and over perimeter drain system by maintaining reflector stakes. Restrict vehicles access to the cap for O&M activities to the southern side where the grade of the side slope is the least.	The MassDEP informed the contractor who mows the landfill cap that driving on the landfill side slopes is prohibited. No evidence of vehicles driving on the landfill side slopes was observed during the February 2009 Site inspection.
Remove overgrown vegetation along fence near Area C Wetland for fence inspections.	Vegetation removal was conducted during the spring and summer of 2005. The vegetation was observed to be well maintained during the February 2009 site inspection.
Repair fence from fallen tree near Area C Wetland to prevent unauthorized access.	Fence repair was completed as part of the O&M activities. The entire perimeter fence was observed to be in good condition during the Site inspection, with the exception of one area noted in Table 9-1.
Remove overgrown vegetation and debris from Trolley Brook and from in front of grate on outlet culvert if surface water flow is restricted.	The vegetation was observed to be cut back and no restrictions to surface water flow were noted during the February 2009 Site inspection.
Repair all areas of exposed geotextile fabric along Chemical Brook. Repair/replace crushed culvert near railroad structure if surface water flow is restricted. Removal overgrown vegetation and debris along entire length of Chemical Brook.	The vegetation was observed to be cut back and no exposed geotextile fabric was observed during the February 2009 Site inspection.
Remove overgrown vegetation from Interceptor Trench if function is inhibited. Do not leave wood chips in Interceptor Trench to clog subsurface fractures.	No overgrown vegetation or wood chips were observed in the Interceptor Trench during the February 2009 Site inspection.
Stock storage shed with equipment/supplies as required by the O&M Plan.	The shed was stocked with supplies during the fall of 2004. During the February 2009 Site inspection, the MassDEP reported that the shed is no longer stocked, and that contractors are required to bring supplies on site as needed.

## **5.2 Progress Since Last Five-Year Review**

Below is a summary of progress since the previous Five-Year Review for each OU.

### **5.2.1 OU #1 Progress**

Construction of the RA for OU #1 was completed in November 1991. Since that time, the MassDEP has been responsible for O&M of OU #1. Quarterly inspections of the OU #1 landfill are conducted and inspection reports are prepared. Corrective actions are performed as needed.

### **5.2.2 OU #2 Progress**

Annual monitoring of about 30 area wells was discontinued in the Fall of 2003. The results identified a well defined VOC plume in shallow groundwater extending beneath a nearby residential area. Several years of monitoring indicated that the plume is generally stagnant, which means that contaminant concentrations have remained relatively unchanged and the overall plume is neither expanding nor contracting. These findings suggest that the DNAPL is an ongoing source of groundwater contamination. Based on these findings, a DNAPL alternatives memorandum was prepared in September 2005 to evaluate options to physically recover the DNAPL.

Renewed concerns over vapor intrusion lead EPA to perform an indoor air assessment in shortly after the completion of the previous five-year review in 2004. TCE and four other contaminants were detected in five (5) of the seven (7) homes sampled at concentrations which exceeded the lower end of the screening level range of 2 to 43  $\mu\text{g}/\text{m}^3$  for TCE. This prompted EPA to complete a focused risk assessment using all the available indoor air data from Nyanza. The risk assessment was completed in October 2005 and concluded that a potentially unacceptable risk from continued long-term inhalation of TCE vapors in seven (7) of the fourteen (14) homes sampled, and in the Town Hall.

Based on groundwater data and the focused vapor intrusion risk assessment, EPA determined that active mitigation of vapors was necessary. In August 2006, EPA distributed a fact sheet by going door to door throughout the impacted neighborhood and held multiple public meetings to describe vapor intrusion concerns and the planned mitigation process. EPA issued an ESD in September 2006, which provided for the physical source extraction of DNAPL and the

installation of approximately 40 VMS to prevent potential inhalation exposures. EPA then verified the actual area to be mitigated by undertaking additional air monitoring and installing several point driven wells along the edges of the defined plume. These activities resulted in the addition of two properties to the vapor mitigation area. VMS installation activities began in May 2007 and were completed in October 2007. Refer to Section 4.2.2 for a description of the activities performed to complete the vapor mitigation phase of the remedy.

The actions taken to date to complete the construction of a DNAPL extraction system are described below.

In September 2006, a conceptual design report was completed which evaluated the use of two different extraction methods: a continuous belt skimmer and a peristaltic pump. The goal of the DNAPL extraction system is to collect as much free-phase DNAPL from the subsurface as feasible with little to no recovery of groundwater.

The conceptual design of the extraction system is summarized as follows: Up to five extraction wells will be installed in the area where DNAPL is known to exist (around MW-113A) and where geophysical investigation data indicates the depression exists in the bedrock surface (south of Worcester Air Conditioning). If feasible, monitoring wells MW-113A and recovery well RW-1 may be used for DNAPL recovery. DNAPL extraction will rely primarily on gravity flow and interfacial tension forces to move free-phase DNAPL into the extraction wells, with subsequent removal by either a belt skimmer or peristaltic pump. A control panel will control operations of the system through a series of conductivity probes and float switches. These input/output functions will be able to turn belt skimmers/pumps on and off, and shut the entire system down in the event of an emergency or when storage tanks are full. The collected DNAPL will be stored in chemical resistant containers until shipped offsite to a licensed treatment, storage, and disposal (TSD) facility. A small building or structure to protect system components will be constructed. The structure should be designed with the consideration of being able to move equipment in and out of the structure, to remove free-phase DNAPL for disposal, to prevent trespassers from entering, and to allow an operator to access all components of the system. The enclosure may need to be heated during winter months since low temperatures could affect the performance and/or integrity of system components.

The conceptual design report evaluated certain project implementation considerations including property access, health and safety issues, and operations and maintenance. The report concludes by estimating the costs associated with the different systems evaluated.

Nobis prepared a technical memorandum to the EPA dated December 5, 2008, documenting the monitoring well surveying and gauging activities as well as the DNAPL exploration activities completed during the fall of 2008. On August 11 and 12, 2008, the Site monitoring wells were surveyed to verify the current condition elevations. Ground surface elevations were found to be altered from those measured during the Remedial Investigation because the Site has been paved and graded. Also, well casing elevations differ from those measured during the Remedial Investigation because of the conversion of monitoring well completion stick ups to flush mounts.

On August 11, 2008, Nobis attempted to locate 25 monitoring wells that were identified as wells of interest relative to the DNAPL investigation. Sixteen of the 25 monitoring wells were located, and it is believed that the building addition to the Worcester Air Conditioning facility covers two of the monitoring wells. Other monitoring wells are believed to be obscured by storage trailers, ground debris, asphalt, and vegetation. The located monitoring wells were opened, their condition noted, and gauged for depth to water and depth to DNAPL (if present). DNAPL was found in monitoring well MW-113A only, at an approximate thickness of 1.5 feet.

Additional DNAPL exploration activities were performed during September and October 2008. The monitoring well MW-113A was gauged for DNAPL thickness on September 30, October 2, October 6, October 16, and October 30, 2008. The thickness of the DNAPL varied from approximately one foot to a skim layer that was not measurable. During each gauging event, a bailer was lowered into the well, and DNAPL was extracted and containerized in an eight-gallon stainless steel drum. Based on the exploration activities, it was determined that DNAPL recharge in MW-113A is slow and was estimated to be between 10 mL to 20 mL per day.

Based on the results of the activities described above, Nobis made recommendations to EPA for further DNAPL assessment and installation of recovery wells. A two-pronged approach is proposed for the citing and installation soil borings. This includes redevelopment of selected existing monitoring wells with hydraulic response testing and a stepped drilling program. The approach will provide additional data to help define the limits and estimate the volume of DNAPL within the Worcester Air Conditioning area. Monitoring wells will be constructed such

that they can be converted to recovery wells if DNAPL is encountered. This approach is pending EPA approval.

### **5.2.3 OU #3 Progress**

Construction activities for OU #3 were completed in November 2001. OU #1 O&M activities were temporarily suspended between 1999 and 2002 to allow OU #3 RA construction activities to be completed. OU #1 and OU #3 O&M activities resumed in 2003 after OU #3 RA was completed and the O&M Plan was updated. Since 2003, OU #3 has been monitored in conjunction with OU #1. Quarterly inspections are conducted and inspection reports are prepared. MassDEP is also responsible for conducting long-term wetland monitoring activities through 2009. Corrective actions for these areas are performed as needed.

### **5.2.4 OU #4 Progress**

A *Supplemental Baseline Human Health Risk Assessment*, prepared by Roy F. Weston, Inc. in 1999 (Weston, 1999a) assessed the human health risks due to exposure to mercury in the Sudbury River through incidental ingestion of mercury in surface water and sediment and ingestion of mercury through fish consumption. The Weston report concluded that potential human exposure to mercury in surface water and sediment in the Sudbury River was well-below any level of concern; however, exposure to mercury through the catch and consumption of fish from the Sudbury River posed an unacceptable level of risk to subsistence fishermen. A Supplemental Baseline Human Health Risk Assessment (SBHHRA) for OU #4 was completed in May 2006 (Avatar Environmental, 2006). The SBHHRA evaluated both the recreational and subsistence fisherman pathways. The SBHHRA documents the potential mercury exposure and consequent risk to individuals who catch and eat fish from the Sudbury River, providing an addendum to the *Supplemental Baseline Human Health Risk Assessment*, prepared by Roy F. Weston, Inc.

The SBHHRA used data from several species of fish collected by the U.S. Fish & Wildlife Service (USFWS) in 2003 from each of 10 reaches of the Sudbury River to evaluate and identify the human health risk associated with consumption of fish from each of the reaches of the Sudbury River; evaluate the exposure and the consequent risk for those reaches that were not previously assessed; and for those reaches that were previously assessed, identify changes in the levels of mercury in the edible tissue of fish collected in 1993/1994 and again in 2003, and by extension, changes in the potential human health risk during that period. The Supplemental

Baseline Human Health Risk Assessment demonstrated that exposure to mercury from fish caught and consumed throughout the Sudbury River (reaches 2 through 10) poses a health risk to the subsistence angler and that exposure to mercury from fish caught and consumed in select reaches (reaches 2, 3, 4, 6, 8, 9, and 10) of the Sudbury River also poses a health risk to the recreational angler.

A Supplemental Baseline Ecological Risk Assessment (SBERA) for OU #4 was completed in December 2008 (Nobis, 2008). The primary objectives of the SBERA were to:

- accurately identify environmental bioaccumulation for mercury;
- indicate where and what magnitude risks apply to what environmental receptors for which media; and
- otherwise provide data that is useful to the risk manager.

Most of the 10 reaches had two or more lines of evidence to assess risk. Using a systematic weight-of-evidence (WOE) process, the quality of the assessment and the magnitude of response for each line of evidence were integrated. Based on the WOE process, risk criteria, and comparing to concentrations at local reference areas and from regional data sources, only four lines of evidence showed a likelihood of adverse ecological effects above baseline:

- Sediment mercury concentrations compared to benthic community TEC and PEC benchmarks;
- Mercury levels in TL >20 cm fish compared with LEL reproductive CBRs;
- Mercury levels in Reach 8 red-winged blackbird blood (collected in 2005) compared to a generic avian blood effect level; and
- Mercury levels in hooded merganser eggs from Reaches 4 and 8 in 2005.

Overall, the results of this SBERA did not indicate that mercury contamination resulting from Nyanza Site discharges are likely to result in population-level risk to ecological receptors residing in or using the Sudbury River. The conservative assumptions built into this approach support this conclusion, even though there is an acknowledged amount of uncertainty with several of the lines of evidence used to evaluate the six assessment endpoints.

A Technical Memorandum for Remedial Alternative Screening was completed on February 9, 2009 by EPA. (Nobis 2009). The purpose of the Technical Memorandum was to develop a focused subset of preliminary remedial alternatives via initial screening of available technologies to address the human health risks associated with consumption of fish caught in the Sudbury River from Reaches 2 through 10. EPA is currently assuming that a subsistence fishing population does not exist along these reaches and Remedial Action Objectives (RAOs) have been developed for the protection of the recreational fishing population. Preliminary remedial alternatives for the impacted sediments include natural attenuation processes, monitored natural attenuation, hot-spot containment removal and off-site disposal. These alternatives will be further evaluated in the FS.

It is anticipated that the FS and the ROD for OU #4 will be completed in 2009.

## **6.0 FIVE-YEAR REVIEW PROCESS**

This section provides a summary of the five-year review process and the actions taken by EPA to complete the review.

### **6.1 Administrative Components**

James DiLorenzo (EPA Remedial Project Manager) led the Nyanza Chemical Waste Dump Superfund Site Five-Year Review team. Technical Assistance was provided by Nobis. The review was conducted between January 2009 and April 2009. The Scope of Work included the following activities:

- Project Planning and Support
- Document Review
- Standards (ARAR) Review
- Site Interviews
- Site Inspection/Technology Review
- Community Relations
- Five-Year Review Report preparation
- Task Order Close out

## **6.2 Community Notification and Involvement**

A press release was published by EPA in the Metrowest Daily News newspaper on March 19, 2009. The press release summarized the Site activities and that the results of this Five Year Review would be available. A copy of the public notice is included in Appendix E. A second public release will be issued to provide notification of the availability of this Five-Year Review Report.

## **6.3 Document Review**

This Five-Year Review consisted of a review of relevant documents including decision documents, monitoring reports, Remedial Action reports, and Risk Assessment reports. Refer to Appendix A for a complete list of the documents reviewed.

## **6.4 Data Review**

A summary of relevant data regarding the components of the Site remedy is presented below. The results of these sampling events are summarized below by media. These data reviews are related to the completed remedies in place at the Site (i.e. OU #1, OU #2 – VMS component only and OU #3). OU #2 – Groundwater and OU #4 – Sudbury River are currently in progress and the remedies are not yet complete.

### **6.4.1 Groundwater**

As previously indicated, site-wide monitoring of approximately 30 wells was discontinued in late 2003. However, focused groundwater monitoring as required by the O&M Plan for OU #1 and OU #3 has continued on a semi-annual basis since 2003. Monitoring wells are gauged for groundwater elevation and groundwater samples are collected using low-flow sampling methodologies from 15 monitoring wells and the terminal manhole. Groundwater flow directions in overburden and bedrock aquifer zones have been determined to be in a general northeastern direction, from Megunko Hill towards the Sudbury River. In accordance with the O&M Plan, the groundwater samples are analyzed for VOCs via EPA Method 8260B, SVOCs via EPA Method 8270C, TAL Metals via EPA Method 6010B, and Ultra-Trace Mercury via EPA Method 1631.

The laboratory analytical results are compared to the historical sampling results for each well. As mandated by the 2003 O&M Plan, the MassDEP shall be notified if concentrations detected exceed two standard deviations of the historical sampling results. Two standard deviations away from the mean is a typical statistical method for determining data trends and locating



outliers. Analytical results are then compared to the Massachusetts Contingency Plan (MCP) Category GW-1 Standards which applies to current or future sources of drinking water. Due to the nature of the Site being classified under the Superfund program, the MCP does not necessarily apply. However, MassDEP and EPA have determined that use of Method 1 standards would be appropriate benchmarks for evaluating site conditions. These standards are used for preliminary nature and extent evaluation only and are not assumed to be the appropriate cleanup goals for the Site. Only the 2007 and 2008 data reports were reviewed.

The June 2007 groundwater monitoring event detected elevated concentrations (exceeding the MCP GW-1 Standards) for the following VOCs: TCE, cis-1,2-dichloroethene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene, and the following metals: cadmium, mercury, and thallium. These contaminants were detected in groundwater samples collected from both the overburden and bedrock monitoring wells located hydraulically downgradient of the landfill. In general, detected compounds are consistent in location and concentration with the results from previous sampling events. Only two groundwater data points exceeded the two standard deviation unit notification level. These data points were for 1,3-dichlorobenzene and methylene chloride in the sample collected from MW-10B. No detections of SVOCs in the groundwater samples were above the applicable MCP GW-1 Standards.

In general, the December 2007 groundwater monitoring data are relatively consistent with previous sampling events. More contaminants are detected in samples collected from wells located downgradient of the landfill cap. In addition, generally, more contaminants are detected in samples collected from wells screened in the bedrock aquifer zone than in the overburden. The concentrations of contaminants detected in groundwater samples collected from both overburden and bedrock wells continue to fluctuate; however, the overall trend appears to be decreasing. In bedrock monitoring wells MW-3B, MW-10B, and MW-503B, detections of VOCs exceeded the two standard deviation unit notification level. These three wells are located downgradient of the landfill. None of the concentrations of SVOCs detected in groundwater samples exceeded the two standard deviation unit notification level. Finally, the results of the metals analyses indicated that the concentration of mercury in MW-503B exceeded the notification level criteria.

In general, the groundwater data collected during the June 2008 sampling event were relatively consistent with previous sampling events. In general, contaminants were detected in samples

collected from wells located downgradient of the landfill cap, than in other locations. In addition, more contaminants were detected in samples collected from wells screened in the bedrock aquifer zone than in the overburden. The concentrations of contaminants detected in groundwater samples collected from the overburden wells are relatively stable over time, while those in bedrock well samples continue to fluctuate, primarily decreasing. Four groundwater data points in the June 2008 data set exceeded the two standard deviation unit notification level. The exceedances were all detected in monitoring well MW-10A, which is located downgradient from the landfill. It should be noted that this well only has two historic data sets to use in the standard deviation calculation. No SVOCs concentrations were detected in groundwater samples collected during June 2008 that exceeded the two standard deviation unit notification level.

The December 2008 groundwater monitoring data indicated two wells, MW-3A and MW-10A, where compounds exceeded the two standard deviation unit notification level. In monitoring well MW-3A, TCE was detected in exceedance of the notification level. In MW-10A, the following contaminants exceeded their respective notification levels: bis(2-ethylhexyl)phthalate, cobalt, mercury, and sodium. The data set used to perform the standard deviation calculation for MW-10A contains a total of four data points which is a relatively small data set for this type of analysis. In addition, sodium was detected in the associated laboratory method blank. These two wells are both located downgradient of the landfill.

#### **6.4.2 Surface Water**

The first annual surface water sampling event for OU #1 and OU #3 was conducted in June 2005, as dictated in the April 2003 O&M Plan. Surface water samples are collected at nine locations, which based on surface water flow patterns at the Site can be divided into two groups: west and east. The west group includes surface water sampling locations SW-2 through SW-6. In the west group, surface water flow moves from SW-2 and SW-4 towards SW-3 (the sedimentation basin). Surface water flow then moves from SW-3 and SW-5 towards SW-6 (Area C wetland). The east group includes surface water sampling locations SW-1, and SW-7 through SW-9. In the east group, surface water flow moves from SW-1 towards SW-9 (Eastern Wetland). Surface water flow then moves from SW-9 and SW-7 (Area G wetland) towards SW-8. The surface water samples were analyzed for VOCs via EPA Method 8260B, SVOCs via EPA Method 8270C, TAL Metals via EPA Method 6010B, and Ultra-Trace Mercury via EPA Method 1631. Due to the fact that the 2005 surface water sampling event was the first, there

was no historical data available to conduct a trend evaluation or evaluate detections exceeding the two standard deviation unit notification level established in the O&M Plan. However, analytical results were compared with MCP GW-1 Standards.

The analytical results of the June 2005 surface water sampling indicated that VOCs were detected in only three of the nine surface water samples collected. Several VOCs were detected in the SW-8 sample and only in that sample. All detected concentrations of VOCs and metals were below MCP GW-1 Standards. SVOCs were not detected in any of the surface water samples.

Beginning with the June 2006 surface water sampling event, analytical results were compared to the EPA's National Recommended Water Quality Criteria (2006) for metals data, and the Lowest Ecologically Based Criteria developed for the MCP (MassDEP, 2006) for VOCs, SVOCs, and metals data. VOCs were detected in three of the nine surface water samples collected in June 2006. Several VOCs, including TCE, cis-1,2-dichloroethene, chlorobenzene, and 1,2-dichlorobenzene, were detected in the SW-7 and SW-8 samples. However, none of the VOCs detected were at concentrations exceeding the MCP criteria. No SVOCs were detected in the surface water samples collected during June 2006. The analytical results for the metals analyses were all below the EPA and MCP criteria described above.

The results of the surface water sampling performed in June 2007 indicated VOCs in one of the nine samples collected. TCE, cis-1,2-chloroethene, and 1,2-dichlorobenzene were detected in the sample collected at SW-8, however all of the detected concentrations were below the MCP criteria. No SVOCs were detected in any of the surface water samples collected in June 2007. Metals were detected above the laboratory detection limits, but below the EPA and MCP criteria.

The most recent surface water sampling event was conducted in June 2008. For the first time, there was sufficient data to perform a standard deviation analysis of the surface water data set. Several data points for metals at six of the surface water sampling locations exceeded the two standard deviation unit notification level. The majority of these data points are for the sample collected at SW-3 near the sedimentation basin. The standard deviation analysis of the metals data indicated that a couple of patterns were beginning to emerge. Copper was detected at higher than previous concentrations in surface water samples collected from locations within the

east group with the flow pattern from SW-9 to SW-7 to SW-8, two of these data points exceed two standard deviations of historic data. SW-3 flows towards SW-6 in the west group; thus, the higher than previous concentrations of several metals detected in the surface water sample collected from SW-3 were also observed in SW-6. All detected metals were at concentrations below the EPA and MCP criteria. The analytical results for the June 2008 surface water samples indicated that no VOCs or SVOCs were detected.

#### **6.4.3 Sediment**

On March 15, 2006, at the MassDEP's request, soil samples were collected from the bottom of the interceptor trench at three locations for OU #1. The soil samples were collected to determine if soil at the bottom of the interceptor trench could be removed and disposed of in order to support better drainage at the Site. The soil samples were analyzed for VOCs via Method 8260B, SVOCs via Method 8270C, and mercury via Method 7471A. The analytical results of the three soil samples were compared to MCP S-1 Soil Standards, and it was determined that the soil could be removed from the Site as non-hazardous waste.

As required by the O&M Plan, the sedimentation basin bottom elevation is to be surveyed every five years (or as needed depending on significant storm events) to determine whether design capacity is maintained. Design calculations based on an initial survey performed in 2002 indicate that once the bottom elevation of the basin reaches 200 feet relative to mean sea level (MSL), the basin will no longer meet design capacity and will need to be dredged.

On October 22 and 27, 2008, a topographic survey of the sedimentation basin was performed. Over 100 points were surveyed on the toe of the slope of the basin, within the basin on an approximate 25-foot grid pattern, around the rim, as well as several fixed vertical reference points including the sedimentation basin riser pipe, and nearby monitoring wells and drain grates. The survey data showed that the deepest portions of the basin have not filled in above the 200-ft MSL elevation target. Based on the results of the survey, no sediment removal was recommended.

#### **6.4.4 Air Monitoring**

Air screening at the gas vents, monitoring wells, and the terminal manhole is conducted on a quarterly basis as part of the O&M Site inspection for OU #1. Screening for combustible gases, hydrogen sulfide, VOCs, and inorganic mercury is conducted at each point. The most recent

Site inspection was conducted on March 3, 2009, and a report documenting the findings was dated March 2009 and submitted to MassDEP. Air screening was conducted at the base, mid-port valve and vent opening of the five gas vents, as well as over the monitoring wells and the terminal manhole. All monitoring results were below applicable action levels.

#### **6.4.5 Wetland Monitoring**

As mandated by the ROD, periodic inspections and maintenance of the restored wetlands under OU #3 may be necessary to ensure final restoration of designated wetland areas. MassDEP is responsible for monitoring and maintenance of the restored wetlands through 2009. The restored wetlands under OU #3 include the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway. The wetlands restored under OU #1 are Area C and Area G. The USACE recommended that the wetlands restored under OU #1 be inspected concurrently with the OU #3 wetlands. The purpose of the inspections is to qualitatively assess whether the restored areas are meeting the following performance standards for vegetation:

- Emergent Wetlands: Greater than 75% cover by native, noninvasive herbaceous hydrophytic (wetland) plants;
- Scrub/Shrub Wetlands: Greater than 25% cover by native, noninvasive hydrophytic trees and shrubs, and greater than 75% cover of native, noninvasive wetland plants in general (trees, shrubs and herbaceous);
- Forested Wetlands: Greater than 10% canopy cover by native, noninvasive trees, and greater than 75% cover of native, noninvasive wetland plants in general (trees, shrubs and herbaceous); and
- All Wetland Habitats: Less than 10% cover of purple loosestrife (*Lythrum salicaria*), and less than 1% cover each of phragmites (*Phragmites australis*) and Japanese knotweed (*Polygonum cuspidatum*).

The most recent wetlands inspection was conducted on October 15, 2008. The results of the inspection found that the Eastern Wetland, Outfall Creek/Lower Raceway, Area C, and Area G are all meeting the performance standards described above. At Trolley Brook, native wetland species were observed to be growing, however much of the area is supporting non-wetland

plants. The inspection report recommended several action items including continued application of herbicide to undesirable plants like phragmites, hand pulling of undesired invasive species, and monitoring of the aggressive vine species that was observed in the Outfall Creek/Lower Raceway area.

#### **6.4.6 Vapor Mitigation Systems Monitoring**

As outlined in the 2008 Monitoring & Maintenance Manual for the VMS, the MassDEP is inspecting all of the 43 VMS during the winter of 2008/2009. MassDEP was still in the process of conducting inspections during the preparation of this Five-Year Review. The following is a summary of the inspection results obtained thus far.

According to information provided by MassDEP in March 2009, a total of 31 VMS have been inspected to date. All of the systems were found to be operating at the time of the inspections. Excessive moisture was not observed in any of the VMS electrical components. Eight of the 31 VMS units did not achieve the minimum performance standard negative pressure at one or more monitoring points. Issues requiring maintenance, but not affecting the overall performance of the systems, were identified at six of the remaining properties. MassDEP reported that settlement and curing cracks have formed in some of the concrete floors that were poured as part of the VMS installation. MassDEP is implementing repairs where necessary including sealing new cracks, enlarging suction pits and/or installing larger airflow fans, and performing maintenance as required. The inspections are on-going.

#### **6.5 Site Inspection**

The Five-Year Review Site Inspection to assess the protectiveness of the remedies was conducted on February 25, 2009. The inspection was conducted by James DiLorenzo and Jim Murphy of EPA, Dave Buckley of MassDEP, and Jeff McCullough and Danielle Gray of Nobis. A site-specific checklist was used to document the observations made during the inspection. The components of the OU #1 and OU #3 remedies were inspected. Due to the fact that the MassDEP was actively inspecting all of the VMS installed as part of OU #2, these systems were not evaluated on as part of the Site inspection.

Issues and recommendations identified during the Site inspection are further discussed in Section 8.0. Photographs documenting the Site conditions are included in Appendix C. A copy

of the Site Inspection Checklist is included in Appendix D. A summary of the observations made during the 2009 Site Inspection is provided below:

- **Landfill Surface** - The landfill surface was generally in good condition with healthy vegetation that appeared to be well maintained and no obvious signs of settlement, erosion, bulges, or cracks. Issues with vehicles driving on the landfill side slopes were noted during the 2004 Five-Year Review. The gravel on the side slopes was raked and vehicles entering the landfill site were advised to drive on the side of the cap where the slope is the least to prevent further damage. No evidence of damage to the landfill side slopes was observed during the 2009 Site inspection.
- **Cover Penetrations** - There did not appear to be any problems with the cover penetrations, which include the terminal manhole and passive gas vent structures.
- **Roadways and Ditches** - The cap perimeter road appeared to be in good condition with no signs of erosion. The fence perimeter road and Trolley Brook road were snow covered on the day of the Site inspection. Evidence of trespassing was observed near Trolley Brook road and the South Gate. A pile of dumped debris including a tarp, shingles, and roofing materials was observed. The ditches and the Interceptor Trench appeared to be in good condition with well-maintained vegetation that had recently been cut back. No evidence of sedimentation was observed in the ditches.
- **Perimeter Drain Outlet** - The perimeter drain outlet was observed to be in good condition. Water was flowing from the outlet on the day of the Site inspection.
- **Site Fences and Signage** - The perimeter fence around the landfill cap was observed to be in good condition. Slight damage was observed to a small section of the fence near the South Gate; however the damage does not impact the overall integrity of the fence. Barbed wire was observed to be intact along the entire length of the perimeter fence. The four fence gates were observed to be locked and in good condition on the day of the Site inspection. No trespassing signs were posted at 20-foot intervals along the perimeter fence. All signs were observed to be in good condition.

- **Monitoring Wells** – The monitoring wells located within the boundary of the perimeter fence were observed to be properly secured and in good condition.
- **Storage Shed** – Evidence of vandalism was observed at the storage shed. The outer pane of glass on the sky light was broken by a brick. The door to the storage shed is dented but was closed. The roof of the storage shed was also observed to need repair. Two bulged and rusted drums were observed on a palette next to the storage shed. The drums appeared to contain waste personal protective equipment (PPE) from site operations.
- **Eastern Wetland** – The Eastern Wetland was observed from Trolley Brook Road on the day of the Site inspection. The wetland area appeared to be in good condition.
- **Trolley Brook and Chemical Brook** – A build up of debris was observed at the confluence of Trolley Brook and Chemical Brook. It is likely that the debris was restricting the flow into the Chemical Brook culvert.
- **Control Weir** – The structure appeared to be good condition. Minimal debris was observed at the weir gate on the water surface which consisted of leaves and small branches. The water level measurement on the weir was noted at 2.8.
- **Lower Raceway** – Iron fouling/staining was observed along portions of the Lower Raceway. The cause of this was not apparent on the day of the Site inspection. The remainder of the area appeared to be in good condition, and no additional concerns were noted.

## 6.6 Interviews

Interviews of property and business owners adjacent to the Site, home owners with VMS installed at their properties, and of local and State officials were conducted. The objective of the interviews was primarily to obtain general information and to update current understanding of activities at the Site. Summaries of the interviews regarding this fourth Five-Year Review are included in Appendix B.



Four in-person interviews were conducted by EPA on February 25, 2009 with Mr. Dave Buckley (MassDEP Project Manager), Mr. Mike Brogin (facilities manager of the Ashland House), Mr. Dave Foster (Town of Ashland Public Facilities Director), and Mr. Malcolm Smart (member of the Ashland Board of Health). Mr. Buckley reported that some incidents of trespassing have occurred at the landfill site. Evidence of dumping was observed during the Site inspection. Both Mr. Brogin and Mr. Foster reported that increased flooding has occurred around the railroad tracks and Trolley Brook area, and that the flooding has sometimes affected the downtown area. No additional concerns or major issues were raised during these interviews.

EPA conducted two additional interviews on March 6, 2009 with Pastor Charlie Legassey, principal of the Metro West Christian Academy, and Mrs. Gail Melancon, a resident of the Town of Ashland who has a VMS in her home. Pastor Legassey did not express any major concerns regarding the Site, and in general was pleased with the level of communication from the MassDEP and the EPA concerning activities at the Site and around the town. Mrs. Melancon reported that she was generally pleased with how the work to install the VMS was conducted. She did raise concerns about cracks that have occurred in her basement floor since the installation of the VMS. Mrs. Melancon expressed her desire for good communication from the MassDEP going forward concerning the maintenance and inspection of her VMS. No additional issues or concerns were raised during the interviews.

## **7.0 TECHNICAL ASSESSMENT**

This section provides a technical assessment of the remedies implemented at the Site, as outlined in the Comprehensive Five-Year Review Guidance (EPA, 2001b). The remedies have been evaluated based on their function in accordance with decision documents, their adherence to valid risk data and scenarios, as well as any other information that could have affected the remedy's protectiveness.

### **7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?**

#### **OU #1**

Yes. The results of the monitoring data review and the Site inspection indicate that the remedy is functioning as designed. Overall, the Site was well maintained and appeared to be in good condition. The issues identified during the Site inspection do not affect the overall

protectiveness of the remedy. The cap is functioning as designed and is in good overall condition. The cap remains as a protective barrier to prevent exposure to human trespassers and burrowing mammals. The groundwater diversion trench and associated drainage ways are being actively maintained and appear to be functioning as designed. The results of the groundwater monitoring data indicate that the concentrations of contaminants detected in samples collected from both overburden and bedrock wells continue to fluctuate; however, the overall trend appears to be decreasing. The most recent surface water monitoring data did not detect contaminant concentrations above the applicable EPA and MCP standards. Air monitoring data indicates that no contaminants are being transported off-site. The restored wetland areas are being actively maintained and appear to provide a functioning habitat. Finally, the potential for direct human contact to contaminated sediments has been mitigated by the Site security fences.

## **OU #2**

No. Based on monitoring data collected to date, eight of the VMS do not achieve the minimum negative pressure based on pressure performance monitoring at one or more locations. The ESD issued in September 2006 created two remedial phases: 1) installation of VMS in buildings located over the contaminated groundwater plume, and 2) installation of a DNAPL extraction system. The first phase of the remedy has been implemented and the MassDEP is currently performing the O&M of the VMS. The second phase is currently being implemented, and therefore cannot be evaluated until its completion.

MassDEP is performing inspections of the 43 VMS concurrent with the preparation of this Five-Year Review. According to the most recent information provided by the MassDEP, 31 of the 43 systems have been inspected. All 31 systems were found to be operational. However, 8 systems did not achieve the minimum negative pressure based on performance monitoring at one or more locations. Because the inspections are on-going, no conclusions or recommendations were available from MassDEP at the time of this five-year review report. Repairs are being implemented by MassDEP where necessary to ensure that the VMS remedy remains protective of human health and the environment.

The groundwater monitoring program mandated by the ESD has not yet been implemented. The ESD mandates that the EPA will reinitiate groundwater sampling of off-site groundwater on a once per year basis. Six additional monitoring wells were installed and sampled, along with

two existing monitoring wells, in November 2006 to more accurately delineate the shallow VOC plume as mandated by the ESD.

Finally, the institutional controls mandated by the ROD have not yet been implemented. There are currently no formal controls in place to prevent the installation of drinking water wells or contact with contaminated groundwater through excavation. In order to insure that the remedy remains protective in the long-term, institutional controls need to be implemented to prevent exposure to contaminated groundwater. As described in the ESD, an informal notification process has been used whereby the Town of Ashland seeks EPA's input into construction projects located within the extent of the known groundwater plume. Although not mandated by the ESD, EPA intends to establish institutional controls to prevent future inhalation of vapors. Due to the numerous residential properties requiring controls, EPA will request that the Town of Ashland establish a zoning ordinance to provide the necessary controls. These controls will be formalized in the pending final ROD for OU#2.

### **OU #3**

Yes. The results of the monitoring data review and the Site inspection indicate that the remedy is functioning as designed. Overall, the Site was well maintained and appeared to be in good condition. The issues identified during the Site inspection do not affect the overall protectiveness of the remedy. The cap is functioning as designed and is in good overall condition. The cap remains as a protective barrier to prevent exposure to human trespassers and burrowing mammals. The results of the groundwater monitoring data indicate that the concentrations of contaminants detected in samples collected from both overburden and bedrock wells continue to fluctuate; however, the overall trend appears to be decreasing. The most recent surface water monitoring data did not detect any contaminant concentrations above the applicable EPA and MCP standards. Air monitoring data indicates that no contaminants are being transported off-site. The restored wetland areas are being actively maintained and appear to provide a functioning habitat. Also, the requirement for coverage of wetland native species has been met for a majority of the area and other areas are close to achieving the required coverage. Finally, the potential for direct human contact to contaminated sediments has been mitigated by the Site security fences.

## 7.2

### **Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid?**

#### **OU #1**

No. Some of the exposure assumptions and toxicity data used at the time of the remedy selection are not still valid since the RI/FS was completed in 1985, which was prior to the existence of current EPA risk guidances. However, excavation and consolidation of contaminated soil, sediment, and sludge in the former on-site sludge disposal area and capping of the Hill area have essentially eliminated the potential for exposure to hazardous substances at OU #1. Therefore, the remedy is still protective of human health. The ROD did not establish clean-up standards beyond achieving background levels. The RAOs used at the time of the remedy selection are still valid.

#### **Changes in Land Use of the Site and Physical Site Conditions**

No changes in land use or the physical conditions of the property have occurred since the 2004 five-year review. The Site remains vacant, capped, and fenced. The residential development adjacent to the south end of the Site was approved by the Town of Ashland in 2008; however, construction has reportedly been postponed indefinitely due to poor economic conditions. Redevelopment of the landfill area of the Site as a golf course was proposed as a component of the residential development. Currently, the Town of Ashland is evaluating options of renewable energy technologies (i.e. solar and wind) for the landfill cap area.

#### **New Contaminants and/or Contaminant Sources**

No new contaminants or contaminant sources have been identified since the remedy.

#### **Changes in Standards or TBCs**

Since the ROD did not specify any chemical-specific ARARs or TBCs there were no standards to review, except for the human health risk assessment guidance described below.

#### **Changes in Exposure Pathways, Exposure Assumptions, Toxicity Values, and Risk Assessment Methods**

Excavation and consolidation of contaminated soil, sediment, and sludge in the former on-site sludge disposal area and capping of the Hill area have essentially eliminated the potential for

exposure to hazardous substances at OU #1. Therefore, changes in exposure pathways, exposure assumptions, toxicity values, and risk assessment methods, which have occurred since the time of the RI/FS and ROD, do not impact the protectiveness of the selected remedy.

## OU #2

No. Some of the exposure assumptions and toxicity data used at the time of the original remedy selection are not still valid since the RI/FS was completed in 1990, which was prior to the existence of current EPA risk guidances. However, the remedy selected under the OU#2 ROD (1991) has been superseded by the 2006 ESD. The ESD required installation of vapor migration systems and DNAPL extraction wells. The installation of vapor migration systems was completed in 2007. Installation of DNAPL extraction wells is underway. A focused risk assessment in 2006 addressing vapor migration into indoor air supported the ESD. Exposure assumptions and toxicity data used at the time of the focused risk assessment are still valid. Vapor mitigation systems are intended to eliminate the potential for vapor intrusion into homes. Therefore, this portion of the remedy is designed to be protective of human health by eliminating the exposure pathway. The risk assessment of other pathways, including use of groundwater as drinking water and direct contact with groundwater in residential basements, was conducted prior to the 1991 ROD. Exposure assumptions and toxicity data used at the time of this earlier risk assessment are or are not still valid. Groundwater is not currently used as a drinking water source. Direct exposures to groundwater in basements or exposures to surface water from groundwater remain a concern. MCLs and vapor intrusion screening levels provide the basis of clean-up goals for groundwater. The RAOs used at the time of the ESD are still valid.

## Changes in Land Use of the Site and Physical Site Conditions

No changes in land use or the physical conditions of the property have occurred since the ESD. The Site itself remains vacant, capped, and fenced. Groundwater is not used as a drinking water source. No new development has occurred in areas above the groundwater plume.

## New Contaminants and/or Contaminant Sources

No new contaminants or contaminant sources have been identified since the ESD. The primary contaminant of concern in the ESD is TCE.

## Changes in Standards or TBCs

There are no changes in standards.

### Changes in Exposure Pathways, Exposure Assumptions, Toxicity Values, and Risk Assessment Methods

The EPA Office of Solid Waste and Emergency Response (OSWER) recommends in its 2003 Directive 9285.7-53 to use a hierarchy of three tiers for sources of toxicological information for human health toxicity value: Tier 1 – EPA's Integrated Risk Information System (IRIS); Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs); and Tier 3 – other toxicity values including, but not limited to, peer-reviewed values from the California Environmental Protection Agency (Cal EPA), the Agency for Toxic Substances and Disease Registry (ATSDR), and the EPA Health Effects Assessment Summary Tables (HEAST).

For TCE, there is currently no toxicity value available for Tier 1 and Tier 2. However, for Tier 3, there are the Cal EPA cancer toxicity value and the New York State Department of Health (NYS DOH) non-cancer toxicity value that can be used when evaluating TCE exposures via the inhalation pathway. Consistent with the recommendation from the 2003 OSWER Directive, these values are peer reviewed and recommended for use to evaluate lifetime excess cancer risk and non-cancer hazard from TCE exposures.

Applying the Cal EPA inhalation cancer toxicity value for Nyanza OU #2, TCE indoor air concentrations corresponding to target cancer risk levels of  $1 \times 10^{-6}$ ,  $1 \times 10^{-5}$  and  $1 \times 10^{-4}$  would be  $1.2 \mu\text{g}/\text{m}^3$ ,  $12 \mu\text{g}/\text{m}^3$ , and  $120 \mu\text{g}/\text{m}^3$ , respectively, for the residential scenario. Applying the NYS DOH inhalation non-cancer toxicity value, TCE indoor air concentrations corresponding to target non-cancer hazard index of 1.0 would be  $10 \mu\text{g}/\text{m}^3$ ,

Using these Tier 3 toxicity values identified above, the indoor air level of  $10 \mu\text{g}/\text{m}^3$  would correspond to EPA's acceptable risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  and hazard goal of 1.0 for the residential scenario. Since  $10 \mu\text{g}/\text{m}^3$  is within the acceptable risk range and would be considered protective of residents, the selected action level of  $2 \mu\text{g}/\text{m}^3$  is still protective at the Site.

Therefore, no changes in exposure pathways, exposure assumptions, toxicity values, and risk assessment methods have occurred since the time of the ESD that impact the protectiveness of the selected remedy.

Although appropriate at the time of the public health risk assessment, exposure assumptions and toxicity data used prior to the 1991 ROD to evaluate drinking water risks and direct exposures to groundwater in basements are out dated. However, groundwater is not currently used as a drinking water source and MCLs used as interim clean-up criteria are protective of this pathway. Direct exposures to groundwater in basements or exposures to surface water from groundwater remain a concern. Installation of DNAPL extraction wells will serve to reduce migration of contaminants into basements, thus reducing exposures via this pathway.

### **OU #3**

Yes, exposure assumptions and toxicity data used at the time of the remedy selection are still valid. Changes in toxicity values and risk assessment methods have occurred since the remedy selection; however, changes do not impact the protectiveness of the remedy. The remedy is still protective of human health. The ROD established a mercury clean-up goal of 1 mg/kg for sediments in the continuing source areas. The RAOs used at the time of the remedy selection are still valid.

### **Changes in Land Use of the Site and Physical Site Conditions**

No changes in land use or the physical conditions of the property have occurred since the 2004 five-year review.

### **New Contaminants and/or Contaminant Sources**

No new contaminants or contaminant sources have been identified since the remedy.

### **Changes in Standards or TBCs**

The clean-up goal of 1 mg/kg for mercury was selected to be protective of aquatic organisms as well as human health and is based on the National Oceanic and Atmospheric Administration's (NOAA) Effect Range – Median (Long & Morgan, 1991).

### **Changes in Exposure Pathways and Exposure Assumptions, Toxicity Values, and Risk Assessment Methods**

The Human Health Risk Assessment evaluated recreational exposures including swimming, boating, wading, and fishing. Exposure scenarios included exposure through accidental ingestion of and dermal contact with surface water and sediment. In addition to the recreational scenario, a residential scenario, which assumed more frequent exposure to contaminated

sediment was evaluated in bordering wetland areas. Fish ingestion exposure scenarios for the Sudbury River were evaluated for sports and subsistence fishermen. These scenarios and pathways remain valid. EPA does not publish default exposure assumptions for recreational exposures to sediment or surface water or for ingestion of fish. Therefore, standard practice involves site-specific selection of the exposure assumptions. The assumptions used are reasonable, and therefore can be considered still valid. Therefore, no changes in exposure pathways and exposure assumptions impact the protectiveness of the selected remedy.

Toxicity values are updated on an on-going basis by EPA. Since the time of the remedy selection, toxicity values for many of the contaminants evaluated in the human health risk assessment have been updated. In addition, several risk assessment methods have been revised. The risk assessment was conducted prior to the publication of current EPA risk assessment guidance Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Parts D and E) (US EPA, 2001 and 2004). In March 2005, EPA published an updated version of the Guidelines for Carcinogen Risk Assessment and a new supplement, Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens. These documents provide a revised method of evaluating risk to children and adolescents from carcinogens with a mutagenic mode of action, including PAHs. PAHs were detected in sediments; however, they were not considered site-related. The methodology used in the baseline risk assessment, while following standard practice of the time, differs in some aspects from accepted practices used today in risk assessment; however, changes do not impact the protectiveness of the remedy.

### **7.3                      Question C: Has Any Other Information Come To Light That Could Call Into Question the Protectiveness of the Remedy?**

#### **OU #1**

No. There are no new human health or ecological risks that have been identified. The proposed development that was to be located upgradient of the landfill has been postponed indefinitely. The Site inspection and data review did not identify any new information that would call into question the protectiveness of the remedy.



## **OU #2**

Yes. MassDEP has inspected 31 of the VMS, 8 of which did not achieve the minimum negative pressure at one or more locations during performance testing. The minimum pressure performance standard is not a risk-based value, but rather based on the principal that at a certain negative pressure, capture of any vapors is ensured. Although the VMS are operating and generating a negative pressure field, it is not possible to determine if the field is adequate to capture all vapors for those VMS where the minimum pressure performance standard is not achieved at all monitoring points. MassDEP is actively implementing repairs where necessary and attempting to gain access to complete inspections for the remaining systems.

The implementation of the DNAPL extraction phase of the remedy is currently in progress. No evaluation can be made until the remedy is implemented.

## **OU #3**

No. There are no new human health or ecological risks that have been identified. The proposed development that was to be located upgradient of the landfill has been postponed indefinitely. The Site inspection and data review did not identify any new information that would call into question the protectiveness of the remedy.

## **7.4 Technical Assessment Summary**

### **OU #1**

According to the data review, the site inspection and interviews, the remedy is currently functioning as intended by the ROD. The landfill cap area is properly maintained and institutional controls are in place to prevent access to the OU #1 Site. Groundwater data indicates a downward trend and surface water data indicates all detected compounds are at concentrations below EPA and MCP criteria; thus, preventing a risk from exposure.

### **OU #2**

According to the data review, the Site inspection and interviews, portions of the remedy are not completed (i.e. DNAPL remedy); therefore, a determination of its functionality cannot yet be determined. Groundwater monitoring beyond the samples collected in November 2006 has not been conducted in the last five years and needs to occur in order to evaluate the current status

of groundwater contaminant plume and its potential impact to receptors. Institutional controls have not yet been established.

In regard to the vapor intrusion mitigation portion of the OU#2 remedy, the 31 inspected systems are fully operational, however, eight VMS units did not achieve the minimum negative pressure performance standard at one or more locations, and are currently under being evaluated and repaired where necessary to increase the negative pressure readings.

### **OU #3**

According to the data review, the Site inspection and interviews, the remedy is currently functioning as intended by the ROD. The wetland areas and drainageways are properly maintained. Wetlands vegetation growth is continuing with periodic monitoring and maintenance. Surface water data indicates all detected compounds are at concentrations below EPA and MCP criteria; thus, preventing a risk exposure.

## **8.0 ISSUES**

This section provides a summary of the issues identified during this fourth five-year review. Recommendations and follow-up actions are presented in Section 9.0.

**Table 8-1  
Issues  
Nyanza Chemical Waste Dump Superfund Site  
Ashland, Massachusetts**

<b>Issues</b>	<b>Affects Current Protectiveness (Y/N)</b>	<b>Affects Future Protectiveness (Y/N)</b>
Two rusted and bulged drums were observed outside the storage shed.	N	Y
Minor damage to the perimeter fence was noted near the South Gate.	N	Y
A groundwater monitoring program for OU #2 as mandated by the ESD has not yet been implemented.	N	Y
Eight of the vapor mitigation systems installed as part of OU #2 did not achieve the minimum negative pressure when inspected.	Y	Y
The DNAPL extraction portion of the remedy has yet to be implemented.	N	Y
Institutional controls mandated by the ESD for OU #2 have not yet been implemented.	N	Y

## 9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following is a summary of recommendations and follow-up actions that are proposed for the Site.

**Table 9-1**  
**Recommendations and Follow-Up Actions**  
**Nyanza Chemical Waste Dump Superfund Site**  
**Ashland, Massachusetts**

<b>Issue</b>	<b>Recommendations/ Follow-up Actions</b>	<b>Party Responsible</b>	<b>Oversight Agency</b>	<b>Milestone Date</b>
Rusted drums outside of storage shed.	Remove and properly dispose of drums both outside and inside the shed.	EPA	MassDEP	Fall 2009
Damaged perimeter fence near the South Gate.	Repair the section of damaged fence.	MassDEP	EPA	Fall 2009
Groundwater monitoring program for OU #2 has not yet been implemented.	Implement a groundwater monitoring program for OU #2.	EPA	EPA	Fall 2009
Minimum pressure not achieved in eight of the VMS units.	Evaluate systems and implement repairs where necessary to increase negative pressure readings.	MassDEP	EPA	July 2009
DNAPL remedy not yet implemented.	Implement the DNAPL remedy,	EPA	MassDEP	Fall 2009
Institutional controls mandated by the ESD for OU #2 not yet implemented.	Work with Town officials to establish zoning ordinance to prevent consumption of contaminated groundwater and inhalation of vapors.	EPA	None	Fall 2009

## 10.0 PROTECTIVENESS STATEMENTS

### 10.1 Protectiveness of Source Control and Soil (OU #1)

The remedy for OU #1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

### 10.2 Protectiveness of Off-Site Groundwater (OU #2)

A protectiveness statement of the remedy at OU #2 cannot be made at this time until further information is obtained. Further information will be obtained by:

- Completing inspections of the 41 VMS units, and
- Implementing modifications and repairs as required to achieve the minimum pressure based performance standard at all monitoring locations.

MassDEP is actively inspecting the VMS units and implementing repairs where necessary. It is expected that these actions will take approximately 90 days to complete, at which time a protectiveness determination will be made.

### **10.3            Protectiveness of Wetlands and Drainageways (OU #3)**

The remedy for OU #3 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

### **11.0        NEXT REVIEW**

A fifth five-year review for the Nyanza Chemical Waste Dump Superfund Site will be conducted in 2014. The target completion date is five years from the approval of this fourth five-year review.

**APPENDIX A**  
**DOCUMENTS REVIEWED/REFERENCES**

## DOCUMENTS REVIEWED/REFERENCES CITED

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**APPENDIX B**  
**INTERVIEW NOTES**

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1315	<b>Date:</b> 2/25/09
<b>Type:</b> <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> Ashland House		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Mike Brogin		<b>Title:</b> Facilities Manager	<b>Organization:</b> Ashland House
<b>Telephone No:</b> <b>Fax No:</b> <b>E-Mail Address:</b>		<b>Street Address:</b> Main Street <b>City, State, Zip:</b> Ashland, MA	
<b>Summary Of Conversation</b>			
<p>Q: What is your overall impression of the project?</p> <p>A: Everything that has been done so far is good and has helped. There are drainage issues in the town since the landfill cap was constructed. The cage near the railroad tracks (Chemical Brook) need to be cleaned out periodically to prevent flooding.</p> <p>Q: What effects have site operations had on the surrounding community?</p> <p>A: The drainage issues, mentioned above.</p> <p>Q: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.</p> <p>A: No.</p> <p>Q: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>A: No.</p> <p>Q: Do you feel well informed about the site's activities and progress?</p> <p>A: Yes.</p> <p>Q: Do you have any comments, suggestions, or recommendations regarding the site's management or operation?</p> <p>A: No. Everything has been good, and people in town are generally very pleased with the level of service and communication provided by the MassDEP and the EPA.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1420	<b>Date:</b> 2/25/09
<b>Type:</b> <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> Ashland Town Hall		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Malcolm Smart		<b>Title:</b> Member	<b>Organization:</b> Ashland Board of Health
<b>Telephone No:</b> 508-881-0100 (Ashland Town Hall) <b>Fax No:</b> 508-881-0102 <b>E-Mail Address:</b>		<b>Street Address:</b> Main Street <b>City, State, Zip:</b> Ashland, MA 01721	
<b>Summary Of Conversation</b>			
<p>Q: What is your overall impression of the project?</p> <p>A: Sharon Hayes did a great job with public involvement during OU3 construction activity and helped to ease people's worries. Particularly helpful were the monthly site walks for the general public and schools so that people were able to view and better understand the nature of that phase of the cleanup. The EPA has done a good overall job communicating with the town especially during the release of the state's health study and the vapor intrusion activities.</p> <p>Q: What effects have site operations had on the surrounding community?</p> <p>A: Construction activities around the town have caused only minor delays to residents.</p> <p>Q: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.</p> <p>A: There are concerns from downstream towns about the river. The town has constructed two public boat launches. The town is trying to dispel people's worries about the safety of the river. There is a new community group becoming involved with site activities called "We Love Ashland."</p> <p>Q: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>A: He is aware that there have been complaints about the dumping of trash in the vicinity of the capped site on Megunko hill.</p> <p>Q: Do you feel well informed about the site's activities and progress?</p> <p>A: Yes.</p> <p>Q: Do you have any comments, suggestions, or recommendations regarding the site's management or operation?</p> <p>A: Very interested in having EPA facilitate a site walk / tour for the general public in conjunction with Ashland's Earth Day activities during April or May of this year.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1100	<b>Date:</b> 3/06/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Location of Visit:</b>			
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Gail Melancon		<b>Title:</b> Resident	<b>Organization:</b>
<b>Telephone No:</b>		<b>Street Address:</b> Cherry Street	
<b>Fax No:</b>		<b>City, State, Zip:</b> Ashland, MA 01721	
<b>E-Mail Address:</b>			
<b>Summary Of Conversation</b>			
<p>Q: What is your overall impression of the project?</p> <p>A: While the overall vapor mitigation project went smoothly and all involved were very courteous, Ms. Melancon is concerned that there are now cracks in her basement that need to be fixed and wonders whether the cracks have allow vapors to migrate to her living space via basements vents.</p> <p>Q: What effects have site operations had on the surrounding community?</p> <p>A: Construction activities to install the systems were generally noisy, but not a major problem since the work was necessary and of a short duration.</p> <p>Q: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.</p> <p>A: There are no concerns in the neighborhood or in the town that she is aware of. Some residents questioned whether the work was even necessary, but agreed to have it done anyway. The only concerns she has heard is from people who don't live in Ashland and feels that those concerns are likely due to the fact that people outside of Ashland are not as well informed about Nyanza issues as those who do live in town.</p> <p>Q: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>A: No.</p> <p>Q: Do you feel well informed about the site's activities and progress?</p> <p>A: While Mrs. Melancon felt generally well informed about the site overall, she is disappointed that she was not made aware earlier about the potential of cracks in the basement that would need to be observed, addressed, or maintained. Suggested that residents be better informed about any potential issues with the systems going forward.</p> <p>Q: Do you have any comments, suggestions, or recommendations regarding the site's management or operation?</p> <p>A: Suggested that system inspections occur earlier and possibly more frequently at first, following the installation of a vapor system.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1400	<b>Date:</b> 2/25/09
<b>Type:</b> <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> Ashland Town Hall		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Dave Foster		<b>Title:</b> Public Facilities Director	<b>Organization:</b> Town of Ashland
<b>Telephone No:</b> 508-881-0100 <b>Fax No:</b> 508-881-0102 <b>E-Mail Address:</b>		<b>Street Address:</b> 101 Main Street <b>City, State, Zip:</b> Ashland, MA 01721	
<b>Summary Of Conversation</b>			
<p>Q: What is your overall impression of the project?</p> <p>A: The overall bad feeling in town from the 1970s and the early days of the EPA activity relative to the site has improved, and people feel reassured that it's being taken care of.</p> <p>Q: What effects have site operations had on the surrounding community?</p> <p>A: The proposal to build a 150-unit apartment complex near the landfill brought attention to the site, but the plans to construct the apartment complex have been cancelled. There is a lot of interest in town about what can be done with the site; there has been some talk about building a golf course on the landfill cap. Recently, there has been increased flooding around the railroad tracks, and this also affects the downtown area. The flooding appears to be caused by a backup near Trolley Brook and may be related to a possible crushed pipe under the railroad tracks.</p> <p>Q: Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.</p> <p>A: No.</p> <p>Q: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>A: Not aware of any emergency calls, but there have been problems at the landfill site with trespassing and dumping.</p> <p>Q: Do you feel well informed about the site's activities and progress?</p> <p>A: Yes, overall very pleased with the level of communication received by the town from the EPA and MassDEP.</p> <p>Q: Do you have any comments, suggestions, or recommendations regarding the site's management or operation?</p> <p>A: No. Raised a question about the status of the monitoring wells around town. EPA responded that they are planning to sample these wells. Also said the town would be interested in EPA converting one particular monitoring well on town property to a flush mounted style.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1230	<b>Date:</b> 2/25/09
<b>Type:</b> <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> Ashland, MA		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Dave Buckley		<b>Title:</b> Project Manager	<b>Organization:</b> MassDEP
<b>Telephone No:</b> 617-556-1184 <b>Fax No:</b> Unknown <b>E-Mail Address:</b> <a href="mailto:David.Buckley@State.MA.US">David.Buckley@State.MA.US</a>		<b>Street Address:</b> One Winter Street <b>City, State, Zip:</b> Boston, MA 02108	
<b>Summary Of Conversation</b>			
<p>Q: What is your overall impression of the project?          A: Good.</p> <p>Q: Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.          A: Yes. The purpose is to ensure that the remedy is operating as designed. Reports are submitted to the EPA on a regular basis.</p> <p>Q: Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.          A: There have been no complaints relative to the site. There have been incidents of trespassing.</p> <p>Q: Do you feel well informed about the site's activities and progress?          A: Yes.</p> <p>Q: Do you have any comments, suggestions, or recommendations regarding the site's management or operation?          A: No.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Nyanza Chemical Waste Dump Superfund Site		<b>EPA ID No.:</b> MAD990685422	
<b>Subject:</b> Fourth Five-Year Review (2009)		<b>Time:</b> 1200	<b>Date:</b> 3/06/09
<b>Type:</b> <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> Ashland Town Hall		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Jim Murphy		<b>Title:</b> Community Involvement Coordinator	<b>Organization:</b> EPA
<b>Individual Contacted:</b>			
<b>Name:</b> Pastor Charlie Legassey		<b>Title:</b> Principal	<b>Organization:</b> Metro West Christian Academy
<b>Telephone No:</b> 508-881-7404		<b>Street Address:</b> 280 Pleasant Street	
<b>Fax No:</b>		<b>City, State, Zip:</b> Ashland, MA 01721	
<b>E-Mail Address:</b>			
<b>Summary Of Conversation</b>			
<p><b>Q:</b> What is your overall impression of the project?</p> <p><b>A:</b> From the perspective of someone who has closely watched the project from an abutting property since the early 1980s, EPA has done a good overall job of making the best of a bad situation. Pastor Legassey's contacts with EPA have been cordial and professional over the years.</p> <p><b>Q:</b> What effects have site operations had on the surrounding community?</p> <p><b>A:</b> Nyanza has not affected the church nor has it had any negative impact on people sending their children to the school. The Church owns multiple properties along Pleasant Street and has had to deal with various environmental investigations regarding those properties as well as abutting properties over the years without serious negative impacts.</p> <p><b>Q:</b> Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.</p> <p><b>A:</b> No concerns within the church and school relative to Nyanza.</p> <p><b>Q:</b> Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p><b>A:</b> Unaware of incidents at the site.</p> <p><b>Q:</b> Do you feel well informed about the site's activities and progress?</p> <p><b>A:</b> Yes. Primarily because the Pastor has made an effort to stay informed through media, attending meetings, reading EPA materials.</p> <p><b>Q:</b> Do you have any comments, suggestions, or recommendations regarding the site's management or operation?</p> <p><b>A:</b> EPA should continue to be proactive in informing the community about ongoing activities, especially when there is any physical or visible work planned. Be sure to notify the school in advance of coming onto the grounds for any reason.</p>			



## **APPENDIX C**

### **SITE INSPECTION CHECKLIST**

#### **TABLE 2-1 M&M RESULTS: FAILED PERFORMANCE TESTING**

## Site Inspection Checklist

I. SITE INFORMATION																																			
<b>Site name:</b> Nyanza Chemical Waste Dump		<b>Date of inspection:</b> February 25, 2009																																	
<b>Location and Region:</b> Ashland, MA – Region 1		<b>EPA ID:</b> MAD990685422																																	
<b>Agency, office, or company leading the five-year review:</b> EPA		<b>Weather/temperature:</b> Cold and overcast, 30s																																	
<b>Remedy Includes:</b> (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 48%;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other:           </div> <div style="width: 48%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls           </div> </div>																																			
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached <input checked="" type="checkbox"/> Site photographs																																			
II. INTERVIEWS (Check all that apply)																																			
<b>1. O&amp;M site manager</b> _____ <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 30%; text-align: center;">Name</td> <td style="width: 30%; text-align: center;">Title</td> <td style="width: 20%; text-align: center;">Date</td> <td style="width: 20%;"></td> </tr> <tr> <td colspan="4">           Interviewed <input type="checkbox"/> at site   <input type="checkbox"/> at office   <input type="checkbox"/> by phone   Phone no. _____         </td> </tr> <tr> <td colspan="4">           Problems, suggestions; <input type="checkbox"/> Report attached _____         </td> </tr> </table>				Name	Title	Date		Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____				Problems, suggestions; <input type="checkbox"/> Report attached _____																							
Name	Title	Date																																	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____																																			
Problems, suggestions; <input type="checkbox"/> Report attached _____																																			
<b>2. O&amp;M Staff</b> _____ <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 30%; text-align: center;">Name</td> <td style="width: 30%; text-align: center;">Title</td> <td style="width: 20%; text-align: center;">Date</td> <td style="width: 20%;"></td> </tr> <tr> <td colspan="4">           Interviewed <input type="checkbox"/> at site   <input type="checkbox"/> at office   <input type="checkbox"/> by phone   Phone no. _____         </td> </tr> <tr> <td colspan="4">           Problems, suggestions; <input type="checkbox"/> Report attached _____         </td> </tr> </table>				Name	Title	Date		Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____				Problems, suggestions; <input type="checkbox"/> Report attached _____																							
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Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____																																			
Problems, suggestions; <input type="checkbox"/> Report attached _____																																			
<b>3. Local regulatory authorities and response agencies</b> (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. <div style="margin-top: 10px;"> <p>Agency: <u>Town of Ashland Board of Health</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Contact: <u>Mark Oram</u></td> <td style="width: 30%;">Town Health Agent</td> <td style="width: 20%;">2/25/2009</td> <td style="width: 20%;">(508) 881-0100</td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Phone no.</td> </tr> </table> <p>Problems; suggestions; <input type="checkbox"/> Report attached _____</p> </div> <div style="margin-top: 10px;"> <p>Agency: <u>Town of Ashland</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Contact: <u>Dave Foster</u></td> <td style="width: 30%;">Public Facilities Director</td> <td style="width: 20%;">2/25/2009</td> <td style="width: 20%;">(508) 881-0100</td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Phone no.</td> </tr> </table> <p>Problems; suggestions; <input type="checkbox"/> Report attached _____</p> </div> <div style="margin-top: 10px;"> <p>Agency: <u>Massachusetts Department of Environmental Protection</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Contact: <u>Dave Buckley</u></td> <td style="width: 30%;">Project Manager</td> <td style="width: 20%;">2/25/2009</td> <td style="width: 20%;">617-556-1184</td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Phone no.</td> </tr> </table> <p>Problems; suggestions; <input type="checkbox"/> Report attached _____</p> </div> <div style="margin-top: 10px;"> <p>Agency: <u>Town of Ashland Board of Health</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Contact: <u>Malcolm Smart</u></td> <td style="width: 30%;">Member</td> <td style="width: 20%;">2/25/2009</td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Phone no.</td> </tr> </table> <p>Problems; suggestions; <input type="checkbox"/> Report attached _____</p> </div>				Contact: <u>Mark Oram</u>	Town Health Agent	2/25/2009	(508) 881-0100	Name	Title	Date	Phone no.	Contact: <u>Dave Foster</u>	Public Facilities Director	2/25/2009	(508) 881-0100	Name	Title	Date	Phone no.	Contact: <u>Dave Buckley</u>	Project Manager	2/25/2009	617-556-1184	Name	Title	Date	Phone no.	Contact: <u>Malcolm Smart</u>	Member	2/25/2009		Name	Title	Date	Phone no.
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Contact: <u>Malcolm Smart</u>	Member	2/25/2009																																	
Name	Title	Date	Phone no.																																

### III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**  
☐ O&M manual                      ☐ Readily available                      ☐ Up to date                      ☐ N/A  
☐ As-built drawings                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
☐ Maintenance logs                      ☐ Readily available                      ☐ Up to date                      ☐ N/A  
Remarks O&M Manual was not reviewed prior to site inspection.
2. **Site-Specific Health and Safety Plan**                      ☒ Readily available                      ☒ Up to date                      ☐ N/A  
☐ Contingency plan/emergency response plan                      ☒ Readily available                      ☒ Up to date                      ☐ N/A  
Remarks \_\_\_\_\_
3. **O&M and OSHA Training Records**                      ☒ Readily available                      ☒ Up to date                      ☐ N/A  
Remarks \_\_\_\_\_
4. **Permits and Service Agreements**  
☐ Air discharge permit                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
☐ Effluent discharge                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
☐ Waste disposal, POTW                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
☐ Other permits \_\_\_\_\_ ☐ Readily available                      ☐ Up to date                      ☐ N/A  
Remarks \_\_\_\_\_
5. **Gas Generation Records**                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
Remarks \_\_\_\_\_
6. **Settlement Monument Records**                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
Remarks \_\_\_\_\_
7. **Groundwater Monitoring Records**                      ☒ Readily available                      ☒ Up to date                      ☐ N/A  
Remarks \_\_\_\_\_
8. **Leachate Extraction Records**                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
Remarks \_\_\_\_\_
9. **Discharge Compliance Records**  
☐ Air                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
☐ Water (effluent)                      ☐ Readily available                      ☐ Up to date                      ☐ N/A  
Remarks \_\_\_\_\_
10. **Daily Access/Security Logs**                      ☐ Readily available                      ☐ Up to date                      ☒ N/A  
Remarks \_\_\_\_\_

IV. O&M COSTS	
---------------	--

1. **O&M Organization**

<input type="checkbox"/> State in-house	<input checked="" type="checkbox"/> Contractor for State
<input type="checkbox"/> PRP in-house	<input type="checkbox"/> Contractor for PRP
<input type="checkbox"/> Federal Facility in-house	<input type="checkbox"/> Contractor for Federal Facility
<input type="checkbox"/> Other _____	

1. **O&M Organization**
- |  |  |
|--|--|
| <input type="checkbox"/> State in-house            | <input checked="" type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house              | <input type="checkbox"/> Contractor for PRP              |
| <input type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other _____               |  |

2. **O&M Cost Records**

☐ Readily available      ☐ Up to date

☐ Funding mechanism/agreement in place

Original O&M cost estimate \_\_\_\_\_ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

2. **O&M Cost Records**
- ☐ Readily available      ☐ Up to date
- ☐ Funding mechanism/agreement in place
- Original O&M cost estimate \_\_\_\_\_ ☐ Breakdown attached
- Total annual cost by year for review period if available
- |            |          |            |   |
|------------|----------|------------|---|
| From _____ | To _____ | _____      | <input type="checkbox"/> Breakdown attached |
| Date       | Date     | Total cost |   |
| From _____ | To _____ | _____      | <input type="checkbox"/> Breakdown attached |
| Date       | Date     | Total cost |   |
| From _____ | To _____ | _____      | <input type="checkbox"/> Breakdown attached |
| Date       | Date     | Total cost |   |
| From _____ | To _____ | _____      | <input type="checkbox"/> Breakdown attached |
| Date       | Date     | Total cost |   |
| From _____ | To _____ | _____      | <input type="checkbox"/> Breakdown attached |
| Date       | Date     | Total cost |   |

2. **O&M Cost Records**

☐ Readily available      ☐ Up to date

☐ Funding mechanism/agreement in place

Original O&M cost estimate \_\_\_\_\_ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

2. **O&M Cost Records**

☐ Readily available      ☐ Up to date

☐ Funding mechanism/agreement in place

Original O&M cost estimate \_\_\_\_\_ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**  
 Describe costs and reasons: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3. **Unanticipated or Unusually High O&M Costs During Review Period**  
 Describe costs and reasons: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
---	--

**A. Fencing**

1.	<b>Fencing damaged</b>	<input checked="" type="checkbox"/> Location shown on Site map	<input checked="" type="checkbox"/> Gates secured	<input type="checkbox"/> N/A
Remarks: Slight fence damage observed near the South Gate.				

1.	<b>Fencing damaged</b>	<input checked="" type="checkbox"/> Location shown on Site map	<input checked="" type="checkbox"/> Gates secured	<input type="checkbox"/> N/A
Remarks: Slight fence damage observed near the South Gate.				

<b>B. Other Access Restrictions</b>	
-------------------------------------	--

1. **Signs and other security measures**    ☐ Location shown on site map    ☐ N/A  
Remarks: "Do Not Enter" signs were observed along the entire perimeter of the landfill fence.

1. **Signs and other security measures**    ☐ Location shown on site map    ☐ N/A  
Remarks: "Do Not Enter" signs were observed along the entire perimeter of the landfill fence.

### C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented

☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced

☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive by) \_\_\_\_\_

Frequency \_\_\_\_\_

Responsible party/agency \_\_\_\_\_

Contact \_\_\_\_\_

Name

Title

Date

Phone no.

Reporting is up-to-date

☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency

☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met

☐ Yes ☐ No ☐ N/A

Violations have been reported

☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy**

☐ ICs are adequate

☐ ICs are inadequate

☒ N/A

Remarks \_\_\_\_\_

### D. General

1. **Vandalism/trespassing**

☐ Location shown on site map

☐ No vandalism evident

Remarks Evidence of trespassing and dumping outside the South Gate was observed.

2. **Land use changes on site**

☒ N/A

Remarks \_\_\_\_\_

3. **Land use changes off site**

☐ N/A

Remarks A residential development had been proposed on the hill behind the landfill. Construction has been postponed indefinitely.

### VI. GENERAL SITE CONDITIONS

**A. Roads**

☒ Applicable ☐ N/A

1. **Roads damaged**

☐ Location shown on site map

☒ Roads adequate

☐ N/A

Remarks Roads were observed to be in good condition.

**B. Other Site Conditions**Remarks On-site vegetation has been cut back and appears well maintained.**VII. LANDFILL COVERS** ☒ Applicable ☐ N/A**A. Landfill Surface**

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident  
Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
Remarks \_\_\_\_\_
2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident  
Lengths \_\_\_\_\_ Widths \_\_\_\_\_ Depths \_\_\_\_\_  
Remarks \_\_\_\_\_
3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident  
Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
Remarks \_\_\_\_\_
4. **Holes** ☐ Location shown on site map ☒ Holes not evident  
Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
Remarks \_\_\_\_\_
5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress  
☐ Trees/Shrubs (indicate size and locations on a diagram)  
Remarks There is gravel on the side slopes of the cap, which is in good condition.
6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A  
Remarks \_\_\_\_\_
7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident  
Areal extent \_\_\_\_\_ Height \_\_\_\_\_  
Remarks \_\_\_\_\_
8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident  
☐ Wet areas ☐ Location shown on site map Areal extent \_\_\_\_\_  
☐ Ponding ☐ Location shown on site map Areal extent \_\_\_\_\_  
☐ Seeps ☐ Location shown on site map Areal extent \_\_\_\_\_  
☐ Soft subgrade ☐ Location shown on site map Areal extent \_\_\_\_\_  
Remarks \_\_\_\_\_

9.	<b>Slope Instability</b> Areal extent _____ Remarks _____	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability	
<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
2.	<b>Bench Breached</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
3.	<b>Bench Overtopped</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b> Areal extent _____      Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement	
2.	<b>Material Degradation</b> Material type _____      Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation	
3.	<b>Erosion</b> Areal extent _____      Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion	
4.	<b>Undercutting</b> Areal extent _____      Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting	

5.	<b>Obstructions</b> Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map      Areal extent _____ Size _____ Remarks _____ 
6.	<b>Excessive Vegetative Growth</b> Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map      Areal extent _____ Remarks _____ 
<b>D. Cover Penetrations</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	<b>Gas Vents</b> <input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Gas vents were observed from a distance.</u> 
2.	<b>Gas Monitoring Probes</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____ 
3.	<b>Monitoring Wells</b> (within surface area of landfill) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ 
4.	<b>Leachate Extraction Wells</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____ 
5.	<b>Settlement Monuments</b> <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A Remarks _____ 



<b>E. Gas Collection and Treatment</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b> <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____    Depth _____ <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____    Depth _____ <input checked="" type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Deformations</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____
2.	<b>Degradation</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks _____
<b>I. Perimeter Ditches/Off-Site Discharge</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	<b>Siltation</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident Areal extent _____ Depth _____ Remarks <u>Perimeter ditches were in good condition. Vegetation has been cut back.</u>
2.	<b>Vegetative Growth</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____
4.	<b>Discharge Structure</b> <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____
2.	<b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>C. Treatment System</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____	
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		
1.	<b>Monitoring Data</b> <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	<b>Monitoring data suggests:</b> <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	

**D. Monitored Natural Attenuation****1. Monitoring Wells** (natural attenuation remedy)

- ☐ Properly secured/locked      ☐ Functioning      ☐ Routinely sampled      ☐ Good condition  
☐ All required wells located      ☐ Needs Maintenance      ☒ N/A

Remarks \_\_\_\_\_

**X. OTHER REMEDIES**

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

**XI. OVERALL OBSERVATIONS****A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The OU #2 VMS systems are actively being inspected by MassDEP under the M&MM. To date, 31 of the 41 systems have been inspected. All systems were operating at the time of inspection. 23 of the systems were functioning as designed. 8 of the systems failed pressure testing. MassDEP is developing and will implement corrective measures. Attached to this form, Table 2-1 outlines the details of the 8 failed systems and planned corrective measures. A complete VMS inspection report is pending.

**B. Adequacy of O&M**

The O&M activities are properly maintaining the site, and the remedy is functioning as designed.

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, which suggest that the protectiveness of the remedy may be compromised in the future.

Evidence of iron fouling/staining was observed at the outlet of Chemical Brook and Trolley Brook.

**D. Opportunities for Optimization**

None observed at this time.

**Table 2-1 M&M Results: Failed Performance Testing**

Property ID	Address (No public view)	Inspection Results	Concrete	Suction Pt	Electrical	Mechanical	Misc.	Maintenance
5		There is a major crack in the foundation slab floor	X					<ul style="list-style-type: none"> <li>See concrete repair procedures.</li> </ul>
15		<ul style="list-style-type: none"> <li>Far 1 monitoring point failed. Large crack across slab between far point and suction point.</li> <li>The electrical outlet had tripped and was not reset so battery depleted.</li> </ul>	X	0			X	<ul style="list-style-type: none"> <li>Repair concrete per procedures</li> <li>Check MP results, if no influence, after concrete repairs. If no influence, enlarge suction point.</li> <li>Provide owner with information about the CFCI outlet and how to reset</li> </ul>
16		Far 1, Far 2 and Mid 2 monitoring points failed. Mid 2 had water in the annular area around hose.		X	X	X		<ul style="list-style-type: none"> <li>Verify no concrete cracks</li> <li>Replace existing fan with Radonaway 301</li> <li>Enlarge suction Pit</li> </ul>
18		<ul style="list-style-type: none"> <li>All three monitoring points failed.</li> <li>Electrical outlet for alarm was on test mode, so the alarm had no power.</li> <li>CO detector is not working properly.</li> <li>Owner mentioned fan is sometimes loud.</li> </ul>		X			X	<ul style="list-style-type: none"> <li>Enlarge the suction pit</li> <li>Instruction resident about GFCI outlet reset</li> <li>Replace CO detector</li> <li>Add dampers to fan connections</li> </ul>
34		<ul style="list-style-type: none"> <li>Far monitoring point failed and had water in it.</li> <li>Lowest outside pipe support not screwed in.</li> </ul>		X		X		<ul style="list-style-type: none"> <li>Enlarge suction pit</li> <li>Repair/replace pipe support</li> </ul>
37		<ul style="list-style-type: none"> <li>All 3 monitoring point have failed.</li> <li>CO detector not working properly.</li> <li>Property had 13" of water in it during fall '08.</li> <li>Crawl space monitoring point is not secure in concrete slab.</li> </ul>	X	X			X	<ul style="list-style-type: none"> <li>Enlarge suction pit</li> <li>Replace CO detector</li> <li>Concrete repairs for MP</li> </ul>
40		Far monitoring point failed		X				<ul style="list-style-type: none"> <li>Enlarge suction pit</li> </ul>
42		Far monitoring point failed		X				<ul style="list-style-type: none"> <li>Enlarge suction pit</li> </ul>

Note: X – work required in this category. 0 – possible work necessary

**APPENDIX D**  
**PHOTOS DOCUMENTING SITE CONDITIONS**

Photo Number 1 – Drums beside the storage shed.

Date: February 25, 2009



Photo Number 2 – View of the South Gate from the Cap Perimeter Road.

Date: February 25, 2009





Photo Number 3 – View of the fence perimeter road and the interceptor trench. Date: February 25, 2009



Photo Number 4 – View of signs posted along the Perimeter Fence.

Date: February 25, 2009





Photo Number 5 – View of minor fence damage near the South Gate.

Date: February 25, 2009



Photo Number 6 – View of the trash/debris dumped near the South Gate.

Date: February 25, 2009





Photo Number 7 – View from Trolley Brook Road facing south.

Date: February 25, 2009



Photo Number 8 – View of the Eastern Wetland from Trolley Brook Road.

Date: February 25, 2009





Photo Number 9 – Facing north from Road B near the East Gate.

Date: February 25, 2009



Photo Number 10 – View of the interceptor trench from the fence perimeter road. Date: February 25, 2009



Photo Number 11 – View of the landfill cap and gas vents.

Date: February 25, 2009



Photo Number 12 – View of Sedimentation Basin from the fence perimeter road. Date: February 25, 2009





Photo Number 13 – View of the Perimeter Drain Outlet.

Date: February 25, 2009



Photo Number 14 – View of monitoring wells MW-505A and MW-505B.

Date: February 25, 2009





Photo Number 15 – View of the Control Weir.

Date: February 25, 2009



Photo Number 16 – View of debris buildup at Trolley and Chemical Brooks.

Date: February 25, 2009





Photo Number 17 – View of Chemical Brook facing east.

Date: February 25, 2009



Photo Number 18 – View of the Lower Raceway Area.

Date: February 25, 2009





Photo Number 19 – View of the outlet of Mill Pond.

Date: February 25, 2009



Photo Number 20 – View of warning signs posted along the Sudbury River.

Date: February 25, 2009





**APPENDIX E**  
**PUBLIC NOTICE**



United States  
Environmental Protection  
Agency New England

## **EPA Starts Five-Year Review of Nyanza Superfund Site**

The U.S. Environmental Protection Agency (EPA) has begun its fourth Five-Year Review of the Nyanza Chemical Waste Superfund Site in Ashland, MA. These reviews are required by law and occur every five years. The reviews determine if the cleanup remains protective of human health and the environment. This Five-Year Review will be completed by May 2009 and the results will be publicly available.

The components of the current Five Year Review include document search and review, existing data review and analysis, community interviews, site inspection, and protectiveness determination. The focus of this review is the *Source Control and Soil* work that was completed around Megunko Hill in 1992 and the *Continuing Source Areas* work completed in 2000. Activity to address groundwater contamination is currently underway. Later in 2009, EPA plans to release for public comment a proposal to address Nyanza-related mercury contamination in the Sudbury River.

The three previous Five Year Reviews as well as additional information about the Nyanza cleanup can be found on-line at [www.epa.gov/ne/superfund/sites/index2.htm](http://www.epa.gov/ne/superfund/sites/index2.htm) (type in "Nyanza" under the Find a Cleanup Site tab). For more information, contact Jim Murphy Toll Free 1-888-372-7341, ext. 81028 [murphy.jim@epa.gov](mailto:murphy.jim@epa.gov).